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THE IRON AGE

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INDUSTRIAL LITERATURE

HOLLOW MILLS—National Acme Co., E. 131st St. & Coit Road, Cleveland, Ohio. Bulletin No. 3802 describes Namco circular type hollow milling cutters and blocks, applications and production results, and sizes for stationary or revolving type heads.

RUST PROOFING PROCESS—Parker Rust-Proof Co., 2177 Milwaukee Ave. East, Detroit, Mich. Illustrated booklet describes Parkerizing, a rust-proofing process. The application of this process to treating such products as steel windows, screen frames, air conditioning units, sheets, etc., is discussed in detail. Results of tests on this method are also given.

STEEL MILL CONVEYORS—Logan Co., Louisville, Ky. New 34-page catalog covers latest developments in steel mill conveyors and describes all types of gravity and power conveyors as used in the newest mills. Includes data on roller construction, sizes, capacities and other helpful information.

CORE BLOWING MACHINES—Osborn Mfg. Co., 5401 Hamilton Avenue, Cleveland. Catalog No. 110 describes various types of pneumatically operated core blowing machines and contains installation views, blueprints and specifications. Information on core box drawing equipment is also included in this catalog.

REFRACTORY LAGGING—Quigley Co., Inc., 56 West 45th Street, New York. Bulletin covers Insulag, a non-shrinking refractory lagging for interface temperatures up to 2200 deg. F., or for directly exposed surfaces to 2000 deg. F. Material may be applied on hot surfaces and one inch is said to equal nine inches of fire brick in insulating value, while having 1/60th the heat storage capacity of fire brick for the same heat flow.

SOCKET INSTRUMENTS—Westinghouse Electric & Mfg. Co., Newark works, Newark, N. J. Booklet covers the installation and use of sockets that can be installed in power lines and permit instruments to be plugged in at any time without stopping the machine or interrupting the circuit. Enables engineers to have complete information regarding power consumption, etc., at any time. Booklet also illustrates portable instruments, socket instruments and switchboard instruments.

BAKING and DRYING EQUIPMENT—Gehnrich Corp., 35-10 Skillman Ave., Long Island City, N. Y. Bulletin describes many types of gas fired ovens and air heaters for industrial baking, drying and heat treating operations. Among the types discussed in detail are indirect gas ovens, recuperative indirect types, and closet type direct heated ovens. Dimensions are given and construction features are discussed in detail.

LUBRICATION and TRANSMISSION—E. F. Houghton & Co., Third, Amer-

ican and Somerset Streets, Philadelphia. Latest issue of "Research, Illustrated," a house organ that deals with transmission and lubrication problems. Includes a discussion of the general utility of leather, belt costs, lubrication in the presence of moisture and industrial oil filtration. Striking photographs are used to a good advantage in illustrating the text.

PORTABLE COMPRESSORS—Ingersoll-Rand Co., Phillipsburg, N. J. Bulletin describes three new light-weight air-cooled portable air compressors. Smallest model delivers 55 cu. ft. of air per min. at 80 lb. pressure, while the largest provides 105 cu. ft. at 100 lb. pressure. Leaf-type spring mountings are employed and machines may be towed at speeds of 35 mi. per hr. in safety.

SPRAYING and FINISHING EQUIPMENT—DeVilbiss Co., 296 Phillips

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on your
company's
letter-head.
Please mention
The Iron Age.*

Ave., Toledo, Ohio. Catalog covers the company's complete line of spray-painting and finishing equipment. Specifications on all standard items are given and several improvements and additions are discussed.

CHAIN LINK FENCE—Wickwire Spencer Steel Co., 41 East 42nd Street, New York. New 50-page catalog contains complete descriptions and photographs illustrating link chain fence for all types of industrial, institutional and residential property. Construction and specification details are included.

DUST COLLECTING SYSTEMS—Kirk & Blum Mfg. Co., Cincinnati, Ohio. Bulletin describes dust collecting systems in the metal industries and explains the factors controlling the selection of this equipment. Numerous photographs illustrate installations and diagrams show construction features.

BARREL RACKS and HOISTS—Barrett-Cravens Co., 3255 West 30th Street, Chicago. Bulletin shows the manner in which "air-rights" may be utilized

in storing barrels by using Barrett barrel racks. Photographs amplify the discussion by showing practical adaptations of this system of storing. Portable elevators and lift trucks are also described and illustrated.

STEAM and AIR DROP HAMMERS—Erie Foundry Co., Erie, Pa. A well prepared booklet covering Erie steam and air drop hammers. Construction features are explained in detail and photographs supplement the text. Hammers in service various industries are also shown.

INDUSTRIAL TRUCKS—Elwell-Parker Electric Co., 4205 St. Clair Avenue, Cleveland. Two technical bulletins describing the F-8 tiering, tilting and telescoping, fork trucks in capacities from 3500 to 5000 lb., and E-2 tiering and telescoping, platform trucks with a capacity of 5000 lb. Listed features included dynamic brakes supplementary to the travel brakes, ratchets to protect the mechanism at the bottom of down travel and an electric clutch to protect the mechanism at the limit of up travel and when overloaded.

DIESEL and GAS ENGINES—Worthington Pump & Machinery Corp., Harrison, N. J. Profusely illustrated 36-page booklet describes various installations of diesel and gas engines and gives data relative to construction, operation characteristics and ratings.

SIFTING SCREENS—Ajax Flexible Coupling Co., Westfield, N. Y. Folder discusses Vibroplane and Angleplane sifting screens in single or multiple deck, open or closed, level or pitched models. Machines are claimed to be of particular value where close separation and elimination of abrasive action on material being screened are desired.

VALVES and FITTINGS—Walworth Co., 60 East 42nd Street, New York. A 602-page catalog covering the company's complete line of valves, fittings, pipe and tools. Includes a section giving detailed data on types of materials used in making Walworth products, work pressures, test pressures and principal dimensions. New sections describe lubricated plug valves, Hi-Test cast iron pipe, fabricated pipe and Walseal.

A.C. ARC WELDERS—General Electric Co., Schenectady, N. Y. Bulletin No. GEA-1750D tells briefly where a.c. welding equipment can be most profitably used, and discusses the claimed advantages, auxiliary devices and ratings of G-E transformer sets.

STRESS-RUPTURE TEST DATA—Timken Roller Bearing Co., Canton, Ohio. The value of the recently developed stress-rupture test in determining the high temperature characteristics of various steels is discussed in considerable detail in this booklet. Diagrams, tables and photomicrographs substantiate the discussion, which points out the practical and technical value of this test.

... THE IRON AGE ...

JUNE 9, 1938

ESTABLISHED 1855

Vol. 141, No. 23

Men and Machines

In the Automobile Industry

"Due to better machines and more efficient methods, six workers can do the work that required ten in 1920."

—Harry Hopkins.

"As time goes on, there will be more and more men unable to find employment for technological reasons."

—Harold L. Ickes.

"Ever since machinery has come to be the real producing agency of the world, we have had economic maladjustment."

—Senator Claude Pepper.

"There is nothing in the proposition that labor saving devices put more people to work."

—Representative Hatton W. Sumners.

Here are some very definite and positive statements, spoken with conviction. They are typical of the tenor of hundreds of other statements which attribute our misfortunes and our unemployment to the machine.

If it is true that improvement and invention are enemies of mankind, we should by all means curb them. But is it true? Are these gentlemen and others speaking with the authority of facts and experience or are they stating assumptions which will not stand up under the cold, clear light of truth and experience?

It is important that we know. For if we are misled in our hope of making this a better world, into hobbling and shackling the force that has made us, despite depressions, the most prosperous country in existence, then we shall indeed be cutting off our nose to spite our face.

In this and a succeeding article which is based upon an address made by John H. Van Deventer on June 6 before the Economic Club of Detroit, the author presents a factual study of what machines are doing to workers in the most intensively mechanized industry on earth.

(Article on following Page)

INSIDE of the automobile plants of America are thousands upon thousands of machines. They represent the ultimate thus far in inventive ingenuity, in fast automatic operation and high productivity. They form what is undoubtedly the world's premier example of modernized mechanization.

But outside of these factories, and outside of the factories and working places of all of our towns and cities, there is an army of 12 million unemployed, supplemented by 20 million women and children camp followers. It is battling poverty and unemploy-

What Machines Are Doing

An Economic Appraisal of the Motor Car

by 200 a few years ago. The new cotton picking machine, with two men, can do the work of 50. The steam

try to present fairly and as fully as possible its human record to show you what its progress in efficiency has done



IN 1910

THESE workers at the Packard plant, in 1910, rode home on trolley cars. They doubtless would have preferred to drive their own cars, but economic conditions had not yet made that possible.

ment. It is better clad and better fed than was the army of Washington at Valley Forge, but it is fighting with less hope in its heart.

What relation has one picture to the other? Has mechanization, which has proceeded farther and faster in the automobile industry than in any other, been one of the causes which has recruited this tremendous army of men and women who are without work?

There are many who believe that invention and improvement of our means of production are responsible for this deplorable situation. George H. Earle, Governor of Pennsylvania, is one of them. In a recent broadcast, he said:

"In mill and factory, on the farm, on the railroads and down in the mine, men and women are out of work by reason of labor-saving devices.

"The great St. Nicholas breaker in the anthracite region of Pennsylvania, with 60 men, is doing the work done

*The Governor might have added that this same process has been going on for many centuries, ever since the invention of the wheel and the lever. (Editor.)

shovel, with four men, does the work of 75. Everywhere, in practically every line of human endeavor, the story is the same.

"This wholesale destruction of jobs has been going on for years," Earle said, and he contends that the danger point has now been reached.*

It is particularly appropriate to attempt weighing this charge in the automobile industry which is undoubtedly the most efficient in production of all the world.

I am going to attempt to appraise this industry today in terms of manpower versus machine power. I am going to tell you what it has done and is doing with its amazing and seemingly laborless machines to the men and women who work in it and in its related industries. I am going to

to its human material, for that, after all, is far more important than what it has done to iron and steel.

At the beginning of this century, the entire population of Detroit, Lansing, Flint, Pontiac and Akron—now typical automotive cities—was 368,000. Today the population of these five cities aggregates more than 2 millions. They have multiplied themselves over five times in the past 38 years.

Contrast this five-folding of population in these automobile cities with the mere tripling of population in the same period of Buffalo, Cincinnati, Chicago and New York, or with the lesser growth of only 70 per cent for the continental United States as a whole.

Evidently during that period a great many people came to Detroit and its sister automotive cities. They did not

to Automobile Workers--I

Industry

BY J. H. VAN DEVENTER, *Editor The Iron Age*

all come at once and then stop coming. The ingress was gradual and sustained, with each ten-year period showing a larger increment. Something was drawing people there as a powerful magnet draws iron filings.

They came for the same reason that made our forefathers flock to Cali-

be earned in wages and in profitable enterprise.

The richest gold field in the world is that of South Africa. During its productive life-time, it has so far produced a total value in gold of approximately 7 billions of dollars. Let us see what the equivalent in employ-

tunity and wages that have sprung from this industry, let me paint the economic background against which you can see the picture in its true perspective.

There are two schools of thought which are now in sincere but earnest conflict on the subject of production and consuming power. One school believes that you must have consuming power in the form of wages or other types of wealth before you can have production. The other school—and the people in the automobile industry are post-graduates of that—believes that production creates wealth and hence purchasing power. The doctrine of scarcity versus the doctrine of plenty. The puzzle of the hen and the egg.

What I am going to tell you in a moment will, I believe, make it obvi-



IN 1938

TWENTY-EIGHT years later. Packard employees going home from work, but not in trolley cars. Worker ownership of automobiles has made the parking lot problem acute in our automotive cities.

ifornia in 1849 and to the Yukon in 1896. They came to Detroit because men had discovered gold there—the gold of employment opportunity. People came to Detroit and to her sister cities because there was work for them to do. There was money to

ment opportunity and money wages has come from Detroit and her sister cities throughout this land because of the automobile industry.

But before I cite you the amazing figures which record the golden and growing flow of employment oppor-

ous beyond the shadow of a doubt that consuming power is the effect and not the cause; that production, provided you have a useful consumable production, creates the wherewithal to finance buying power.

Back in 1900 when I was a boy,

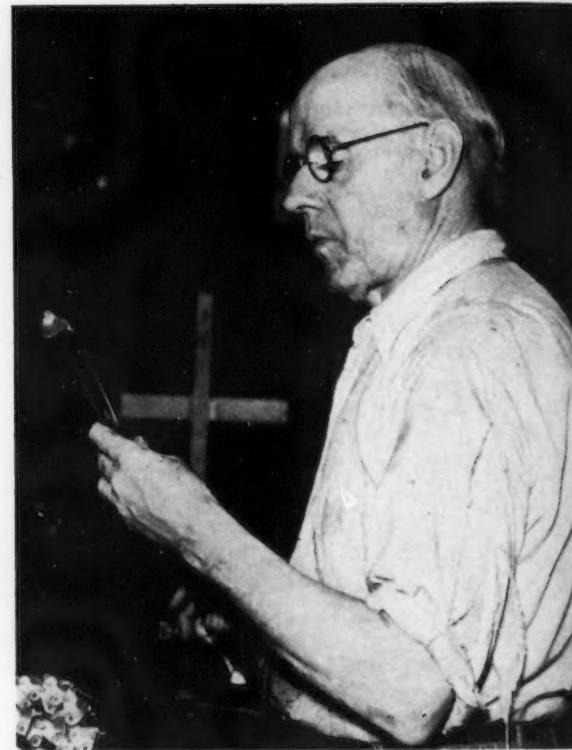


• • •

AT LEFT

ADOLF GUSE, 64 years of age, planer hand with Chevrolet, with which company he started in 1916.

• • •



• • •

AT RIGHT

FRED BAMBLETT, 68 years of age, chrome plater at Packard Motor Car Co. Has had 27 years of continuous employment with the same company.

• • •

about one non-farm family in ten owned a horse and buggy—the other nine couldn't afford to. Nor did one family in ten then have enough surplus buying power to have been able to afford even the lowest priced automobile of today, had such then been available. Today, 1 out of every 1.2 non-farm families owns an automobile.

Did purchasing power create the automobile, or did the automobile create purchasing power?

When the automotive pioneers—Ford, Leland, Briscoe, Durant, and others—first discovered gold on the plains of Michigan, there was not a dollar's worth of employment or of wages available in the industry. It started from scratch.

Since 1900 and including 1937 there had come from that modest little original discovery a golden flow of wages aggregating the stupendous sum of 84 billions of dollars; wages directly traceable to the automobile and which would not have existed except for it. Let us analyze the components of this stupendous figure.

Fourteen billions of dollars had gone into the pay envelopes and the salary checks of the wage earners and the white collar workers in the industry itself.

Two billion dollars had gone into pay envelopes in the steel industry to pay workers for making the steel that is used in automobiles.

Three billion dollars had gone into pay envelopes in the rubber industry to pay workers for making the tires that are required by motor cars.

Two billions of dollars had gone into pay envelopes in the petroleum industry to pay workers for making the gas and oil that automobiles must have to operate.

Thirteen billions of dollars had been paid to road-building labor to make the improved roads that were called into being by the automobile and which would not be necessary except for it.

Fifty billions of dollars had gone into the wages of chauffeurs, truck-drivers, car repair men, service stations and parking lot employees.

Think of it! Eighty-four billions of dollars of wages alone in 38 years from the golden fields of Michigan

and spreading its consuming power from coast to coast throughout this country. Five times as much value taken in wages from this apparently inexhaustible employment mine than the value of all of the gold mined in the whole world in the same period.

To those who believe that wealth creates work, I would pose this question. Where did the wealth come from that created, from nothing in 1900, this huge and vibrant system of enterprise which has generated 87 billions of wage dollars in 38 years and which

MECHANIZATION has extended the mobile industry because it has hardships which once made work and here are some "old timers" who are

now provides employment to one in every seven workers gainfully employed in the United States?

Is it not obvious when you regard this veritable miracle of growth, that production and production alone, created the wealth which financed this accomplishment? Not merely the work of the automobile industry, but work done in all of our factories and on our farms, work done a little better each year and a little more efficiently. Consuming power did not lead the automobile procession, it followed on the heels of more efficient production.

I would not claim for a moment that production always produces wealth. It depends on what it is and how it is done. The first requirement is that the product must be a useful one. The second is that it must be made with constantly increasing efficiency.

The automobile industry is fortunate in that the product is a highly useful one. It met the first requirement. But the industry would not have attained its success, notwithstanding, had not its management met the second requirement.

ophy of more reward for less efficiency.

It bears thinking about, too, that when we thus diminish wealth and consuming power through lessened efficiency we are also decreasing employment opportunity.

Ever since the beginning of the machine age, we have progressed toward higher and higher standards of living, toward higher wages, toward more employment opportunity by following the basic prosperity formula. The automobile industry stands foremost as an exponent of this formula.

The basic formula of prosperity is a simple one. It is this: More power, better machinery, better output per manhour, higher wages, more customer value in price or in quality.

Every successful concern which has served a broad public demand has consciously or unconsciously followed this efficiency formula. And because the automobile industry has followed it more closely and consistently than all others, it has placed itself at the forefront of American enterprise and has been the bell-wether that has led America out of past depressions.

This basic prosperity formula is now being sabotaged. Sabotaged by a number of forces which are working in unison though not yet in combination.

Part of it is due to our hesitant hovering between a philosophy of scarcity and a philosophy of plenty. Part of it is due to the communist's avowed program to wreck capitalism. Part of it is due to the rapid growth of unionism, which being young, feels its oats and tests its power by restricting output. Part of it is due to the mistakes and shortsightedness of management. But the larger part, by far, is due to the state of mind of workers who think of the standing army of 12 million unemployed and who fear to join their ranks.

The "slow down" you may have heard of it here although it is not indigenous to Detroit or to the auto-



the working life span in the automobile industry relieved the workers of the physical age, incompatible. For example, typical of hundreds in the industry.

Production does not always create consuming power. It may destroy it or diminish it. That happens when the work is done with diminishing efficiency. We create wealth when we build needed roads and highways and build them as efficiently as we can with the most modern tools and methods that we have at our disposal. We diminish consuming power—and wealth—when we build them with shovels and wheelbarrows. That bears thinking about in these days of the "slow down" and the peculiar philos-

• • •

PETER NELSON, 82 years of age, paint striper and sander at Packard and with 27 years of continuous employment.

• • •

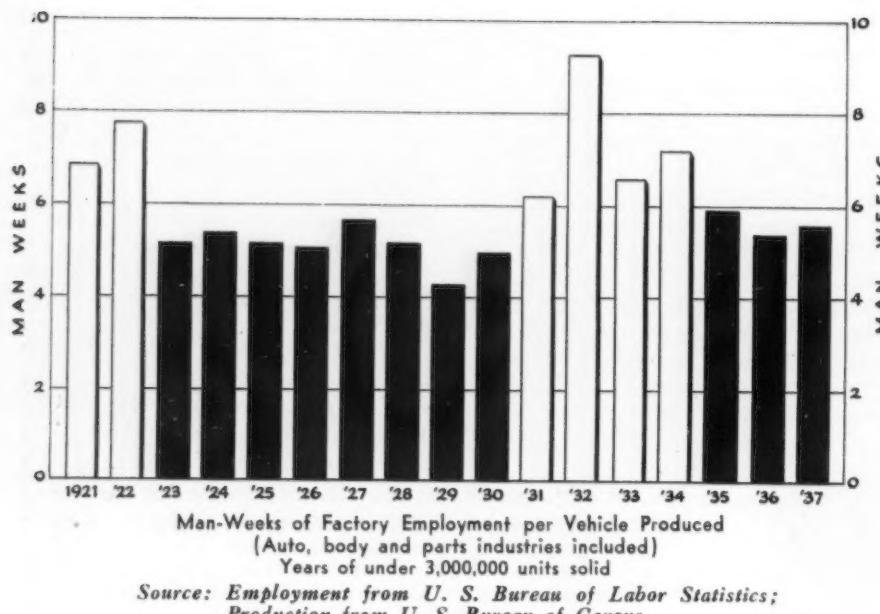
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AT RIGHT

K. S. McWORTHY, 84 years of age, now engaged in light assembly and shaft straightening. 31 years with Packard.

• • •





Source: Employment from U. S. Bureau of Labor Statistics; Production from U. S. Bureau of Census.

motive industry. It is a spreading state of mind—a worker depression psychology—generated by fear of the machine. Fear of technological displacement.

There are two kinds of technological displacement which may create unemployment. One is aggregate dis-

placement in an industry, the other is individual displacement. The first has to do with the long term, the second with the short term. Let us consider the aggregate displacement first.

Aggregate employment considers the industry as a whole. Employment may be said to be in a state of balance in an industry when the number of jobs available in that industry bear a constant relation to the total population or rather that part of the population that is between the lower and the upper working age limits.

An industry whose employment trend is greater than the increase of this portion of population is creating new jobs. An industry whose trend is below that of such population increase is contributing to aggregate unemployment.

One would naturally expect rapid growth during the early periods of a new and expanding industry. But the

automotive industry has continued to grow at a rapid rate even after reaching maturity. It was a full-grown adult in 1929, in fact, an industry that ranked head and shoulders over most and that compared favorably with any other industry in our country in size and volume of annual output. And 1929 was a good year for motor car sales. Production that year for domestic and export sale was 5,400,000 cars in round numbers contrasted with 4,800,000 in 1937.

Yet in spite of a smaller annual output by 600,000 units, employment in the industry was 15 per cent greater in 1937 than it was in 1929. If you contrast this with the 6 per cent increase in the population growth over the same period, you will note that the operation of the machines of the automobile industry did not destroy jobs for men and women; on the contrary, it created new jobs at a rate 2½ times faster than that necessary to maintain an employment balance. As a matter of fact, figures obtained from the U. S. Bureau of Labor Statistics on employment in the industry and from the U. S. Census Bureau on production proved the astonishing fact that the making of each car produced in 1937 afforded 5.6 man weeks of employment to labor as compared with only 4.3 weeks in 1929.

Thus you will agree—you must agree, for the unassailable figures prove it on both of these bases—that there has been no technological displacement whatever of labor in the aggregate in this industry, but, on the contrary, the industry has done more than its expectable share to "take up the slack" and to reduce unemployment.

THE second and concluding part of this presentation will appear in the following issue. It will deal with the subject of individual technological displacement in the industry.

Changes in Labor Productivity and Labor Cost in Selected Industries from 1929 to 1936

Industry	Per Cent Change in Output Per Employee	Per Cent Change in Labor Cost Per Unit of Output
All Manufacturing Industries	+.9	-14.5
Blast Furnaces, Steel Works Rolling Mills	-12.8	0
AUTOMOBILES	-19.0	+9.3
Cement	+2.6	-15.1
Cotton Goods	+4.1	-11.0
Woolen & Worsted Goods	+16.7	-29.4
Leather	-2.9	0
Flour	-5.2	-7.8
Slaughtering & Meat Packing	+5.7	-14.4
Cigars & Cigarettes	+58.2	-48.0
Petroleum Refining	+13.7	-19.5
Rubber Tires & Inner Tubes	+48.2	-31.8
Anthracite Mining	+44.6	-39.4
Bituminous Coal Mining	+2.6	-13.0
Crude Petroleum Producing	+47.9	-45.8
Class I Steam Railroads	+18.8	-15.7
Telephone Industry	+31.3	-10.3

Source: Output per employee and labor cost per unit of output from U. S. Dept. of Labor, Bureau of Labor Statistics, Monthly Labor Review, November, 1937, p. 1066.

Labor Turnover by Age Groups For Model Years 1934-35, 1935-36 & 1936-37

Age Group	Laid Off			Resigned			Discharged		
	1934	1935	1936	1934	1935	1936	1934	1935	1936
-35	33.9%	29.1%	15.1%	6.6%	8.6%	12.3%	2.8%	3.2%	1.7%
20-24	26.4	23.3	11.7	7.9	8.7	10.3	2.4	2.5	1.7
25-29	21.5	17.3	9.0	7.2	7.5	9.0	2.1	1.9	1.1
30-34	19.4	16.2	9.4	7.3	6.8	7.3	2.2	1.9	1.1
35-39	19.1	14.0	8.6	6.7	6.3	6.7	2.2	1.2	1.3
40-44	14.8	14.8	8.0	5.5	4.5	4.7	1.5	1.3	.7
45-49	14.3	9.7	8.2	3.0	4.5	3.0	1.5	1.0	.4
50-54	11.7	10.2	7.3	3.4	1.5	3.3	2.4	0	.2
55-59	4.5	8.1	7.6	2.3	2.4	3.1	2.3	0	0
60 & Over									

Source: Automobile Manufacturers' Association

At a recent joint meeting of the Sheffield Metallurgical Association and the Sheffield branch of the Institute of British Foundrymen, a discussion took place regarding the Iron and Steel Institute's (British) "First Report of the Ingot Molds Sub-Committee." A condensed summary of this discussion, as originally reported by *Iron and Coal Trades Review*, follows:

R. P. Smith, opening the discussion, said it might be of interest to show how important a matter it was, to tell them what an investigation by Mr. Bacon had meant to Steel, Peech & Tozer. When Mr. Bacon started his investigations in 1932 they were using about 29 lb. of mold metal per ton of steel for what they called their standard mold, which was then a 21½-in. open-top mold. That figure had now been reduced to 15½ lb. and the saving to the Templeborough melting shop alone amounted to roughly \$1500 per week.

N. H. Bacon said he would like to comment on the variation in the life of molds supplied by different makers, particularly the fact that variation had often been put down to different practices in the shop itself. The mold makers accepted responsibility. Re-

Life of Ingot Molds

• • •

cently—a matter of five or six months ago—they had found it necessary to take that matter a step further and to keep the molds definitely in batches. That was to say, put 24 new molds in use and keep them altogether throughout their lives.

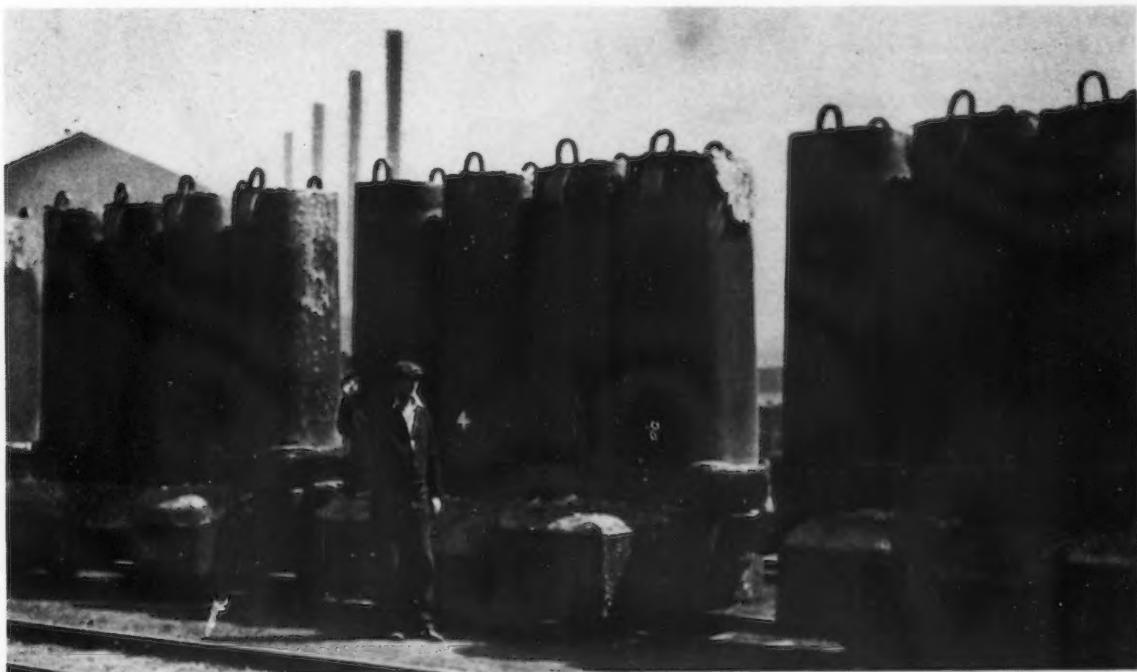
Continuing, Mr. Bacon said that failures occurred by crazing and cracking. He thought they might perhaps be attaching too much importance to the question of cracking. They found they got the best results when they had 50 per cent of the molds failing by cracking. If they got 100 per cent failure due to crazing, there was something wrong—the

mold metal was too soft or too thin. For 100 per cent failure by cracking, they were making the mold metal too hard or the walls too thin. The other point was the effect of silicon. They did find that, with 2 per cent silicon, a higher manganese was definitely beneficial. Since that time they had stored 1000 molds, all treated in the same way, and they had investigated those molds and checked the curve. There were a large number of molds, of course, at each point. When they came to classify the molds according to manganese and silicon, they found that, whereas the high manganese was beneficial with the high silicon, definitely low manganese was beneficial with low silicon.

K. R. Binks said he noted in the original report a reference to Mr. Reagan's paper on "Some Factors Affecting the Life of Ingot Molds," and on looking through that paper and its discussion at the Cleveland (U. S. A.) meeting of the American Institute of Metallurgical Engineers, the greater number of mold lives obtained was rather striking. There were mold lives of 250 to 175 ingots recorded for a 17-in. fluted mold, similar in general outline to B5 mold, described in

(CONTINUED ON PAGE 73)

SWITCHING of ingot molds filled with steel at the Gary works of the Carnegie-Illinois Steel Corp.



An Appraisal of Cold Heading

THIS is the first of a series of articles reviewing the present state of the art of cold heading. In this section, the author discusses the field of application of cold upsetting, factors relating to the relative amount of upset, limitations on size and materials, and a rather complete discussion of the requirements of cold heading steel wire, together with its prior and subsequent heat treatment. In the second part to follow, the general characteristics of cold heading machines and related

equipment will be pointed out. Part III will cover questions relating to dies, and the fourth and last article will concern itself with the relation of die life to die heat treatment. The material forming the basis of this review was obtained by staff visits to many of the leading makers of cold headed products and from information supplied by cold heading equipment manufacturers, wire suppliers and specialists in steels and other materials for cold heading dies.

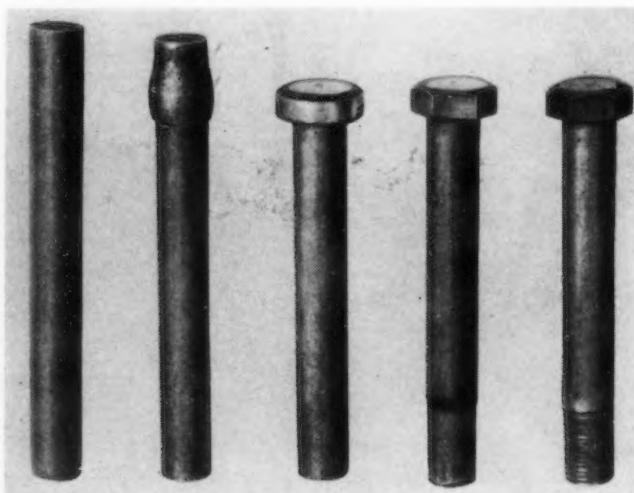
THE cold heading or cold upsetting technique is particularly applicable to the manufacture of bolts and capscrews and a host of special derivative parts where the diameter of head is substantially larger than the shank or main body of the piece. This condition at once establishes its position economically, without any consideration of its inherently high speed character. Small capscrews can now be turned out at the rate of 225 a min. It is a process that competes with automatic screw machine products on the one hand and hot forged products and castings on the other. Formerly all upsetting was done hot, but largely because of the improvement in materials, most of the commercial metals and alloys are now malleable enough at room temperature to withstand plastic deformation without failure and frequently without the necessity of subsequent heat treatment. The increasing demand for smoother shanks on bolts and capscrews, free from scale and accurately sized was what brought into existence the cold heading industry. Closer tolerances have been made possible through development of more rugged

and accurate upsetting machines and better die steels.

Hand in hand with cold heading

usually goes thread rolling, an extremely rapid process that has become accurate enough to make Class 2 and Class 3 threads, as machines and die materials are improved. In thread rolling, while unsupported on centers, the shank is rapidly rolled laterally between two dies, one of which is fixed and the other reciprocated by a crank motion. The forming grooves in the dies are straight and are at an angle corresponding to the helix angle of the thread. The material of the blank is not cut, but is cold formed into hills and valleys. The fibers of the steel, which are usually parallel to the axis of the blank, are thereby crimped, adding strength and toughness to the threaded section.

For the combined operations, savings from 25 to 89 per cent in direct labor and material have been made over costs on the same parts turned out in screw machines. Combination of heading, reheading, single and double extrusion offers additional avenues of saving. In some instances,



STAGES in the cold heading of a bolt. From left to right—Cut-off; first blow, coning; second blow, heading; trimming hexagon head and extruding shank for rolled thread in a trimmer; thread rolled. Sometimes, the extrusion is combined with the first heading operation.

Practice . . .

By FRANK J. OLIVER
Associate Editor, The Iron Age

parts requiring an assembly of two or three pieces are being produced as one piece on an upsetting machine at considerably lower cost than they could be produced by any other known method. In fact, some of these parts, with offset heads and other projections, could be produced otherwise only by forging or casting.

Tolerances on cold heading wire, which is invariably a cold drawn product, are such that pitch diameter stock can be specified, although the newer techniques of single and double extrusion eliminate this element and save in other directions, such as reducing the relative amount of upset.

Probably no industry has contributed more to the development of the cold heading industry than the motor car manufacturer, who has been calling for enormous quantities of stronger and more reliable parts produced at lower cost. Although two of the automobile builders have installed cold heading departments for part of their requirements, these, as well as

the rest of the industry, have benefited largely from the ideas coming from the bolt and nut makers. As a

National Screw & Mfg. Co.
Russell, Burdsall & Ward Bolt Co.
E. J. Manville Machine Co.
National Machinery Co.
Waterbury Farrel Foundry & Machine Co.
B-W Mfg. Co.
American Steel & Wire Co.
Bethlehem Steel Co.
Carboloy Co.
Carpenter Steel Co.
Continental Steel Co.
Crucible Steel Co. of America
Jessop Steel Co.
Jones & Laughlin Steel Co.
Ludlum Steel Co.
Pittsburgh Steel Co.

Acknowledgment

The following companies courteously contributed data on their cold forging operations, wire materials, die steels and equipment, from which this series of articles was written:

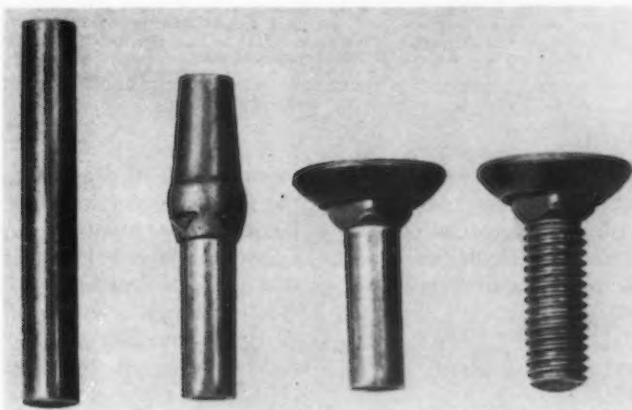
Cleveland Cap Screw Co.
Dodge Brothers Division of Chrysler Corp.
Ford Motor Co.
General Electric Co.
International Harvester Co.
Lamson & Sessions Co.

result there has been a constantly improved standard of physical properties and tolerances, together with a lowered cost.

Relative Amount of Upset

The amount of upset is usually described as the length of the original wire, in terms of its diameter, that can be crowded into the head. Hardness of the wire is one of the most important factors relating to the amount of upsetting. The softer the material, the more readily is it headed; conversely, the harder the material, the better it is cut off with a clean, 90-deg. cut. The amount of upsetting depends also on the type of equipment and the manufacturing practice. With two and three blow machines, upsetting of stock six diameters long is not excessive. With certain annealing operations and special dies, even more stock may be gathered. One of the leading cap screw companies, however, has been able to hold the ratio considerably below this by a patented technique.

In the Kaufman single extrusion process, wire of nominal diameter is



CARRIAGE bolt formed in a double stroke header from pitch diameter wire stock, with the thread rolled right up to the square underpart of the head. Work of this type is usually performed with a spring punch to form the cone.

extruded to pitch diameter for the thread section and the head is then upset in the usual manner. By using wire of this size, rather than pitch size, a considerable volume of stock may be upset and for a given head size, less plastic flow of metal is produced. Another type of Kaufman machine (not commercially available) performs double extrusion in a multi-die, single stroke machine. In this process, the diameter of the wire used is usually $1/16$ in. larger than the unthreaded portion of the bolt shank. The wire is first extruded to the nominal diameter and in the next station, the threaded part of the shank is extruded to the pitch diameter for thread rolling. Because the bolt head is made from a much larger diameter than conventional practice, it experiences a minimum of cold working. The additional cold working of the threaded part, on the other hand, gives a higher tensile strength and tends to counteract the relative loss of volume at the root diameter.

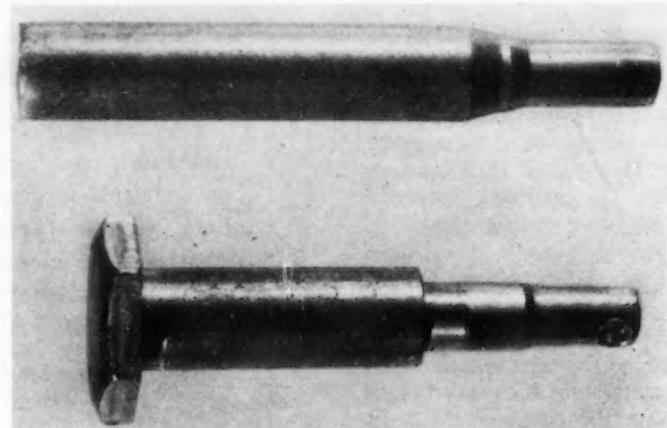
Materials

Both high and low carbon steels are being cold headed and some of the alloy steels, including stainless, as well as non-ferrous materials. The present limit on carbon is about 0.50 per cent, with the SAE 1035 grade the most commonly used in the higher range. In the alloy series, SAE 3135 nickel chromium steel and the $3\frac{1}{2}$ per cent nickel SAE 2330 steel are quite widely specified. How the steel is manufactured, its grain size and its surface finish or coating are all matters of specification and will be treated in detail later on in this article.

The use of stainless steel for bolts, nuts, special upset parts, cotters and U-bolts is rather common today where corrosion and heat resistance are required, as well as appearance. One of the leading bolt and nut manufacturers makes these products of two grades of austenitic stainless steel, the 18-8 and the 25-12 varieties, the latter intended primarily for high temperature service. This company also makes bolts and nuts of 12 to 17 per cent straight chromium stainless steel. Monel metal is another material of similar application that is being cold headed into bolts and capscrews. Screws for delicate instruments are being cold upset from Invar metal, containing 35.5 per cent nickel and with an insignificant coefficient of expansion. The aircraft industry is calling for bolts and nuts of aluminum upset cold. New techniques have also been developed for upsetting the va-



ECCENTRICITY of the head makes this brake shoe anchor bolt a difficult cold heading job. Made of an open hearth steel of 0.40-0.45 C., 0.70-0.90 Mn. and 0.15-0.25 Mo., this piece is headed in a two-stroke machine with open dies. Part of the head is formed in the punch and part in the die proper. The parting line is plainly seen. The longitudinal projections on the head are the result of air vent channels necessary for proper seating in the die. Wire diameter is $7/16$ in.



THIS motor hold-down bolt is first extruded twice to different diameters from $\frac{5}{8}$ in. wire in a double stroke, open-die header, with the extrusion dies carried in the punch. In a second machine, a reheader, the round bolt head is formed, and in a third, the hexagon head is trimmed and the second step of the shank extruded further. The square shoulder is formed by a cutting tool in a screw machine.



THERE are now three steps required in the manufacture of a Ford valve spring retainer. Mild steel wire, 0.640 in. in diameter is fed into a double-stroke, solid-die header, and is successively formed into the shapes shown at A, B, C and D. O.D. of the flange is 1 in. thickness $5/64$ in. In a reheader, the nib is pushed out, blanking the center hole, and in a second reheader, the piece is slotted and the sides trimmed to $13/16$ in. on the flats. Production is 26,000 pieces in 8 hr.

rious brasses and bronzes for corrosion-resistant fastenings. All these materials with the exception of aluminum are more difficult to upset commercially and usually production is confined to small parts.

Limitations on Size

In the final analysis, economics will determine the limit on the size of material that can be cold upset. The cost of hot rolled versus cold drawn material is a factor that will govern, for example, whether a part be hot forged or cold headed. Questions of first cost and size of the machine for a given

capacity will also govern, as well as the size of production runs, which are bound to be small on larger parts. Canvassing the bolt makers, we find that the practical limit is $\frac{3}{8}$ to 1 in. diameter, with a length of 6 to 9 in. A $1\frac{1}{2}$ in. machine has been built for making rolls for roller bearings, and one of the automobile companies has a $1\frac{1}{4}$ in. machine. One of the largest and toughest jobs in production is being run on this machine. This is upsetting the head of a kingpin spindle bolt for a truck, the size of the stock being 1.045 in. diameter. The material is an exceedingly tough alloy steel with 0.75 per cent Cr., 0.70

Mn. and 0.20 C. Experimentally, on the same machine, a drain plug of low carbon steel is being cold headed from a 1 7/16 in. slug into a thin rough blank 2 3/8 in. in diameter. This is later trimmed to 2 in. hexagon.

Steel Characteristics

When a decision is to be made regarding specifications for steel for cold headed parts, there are a number of factors that must be taken into account. The function of the part, its required strength and toughness or hardness usually determine whether it is to be high or low carbon steel or some of the commonly used alloy grades. Other factors to be discussed relate to the type of steel, either rimmed or killed, its inherent grain size, its prior heat treatment, and the type of coating desired.

Where the cold heading operation is severe, a rimmed steel is usually

the most successful. Of course, these rimmed steels are available only in the low carbon grades and conventionally do not greatly exceed 0.12 per cent in carbon content. By virtue of the onion skin type of freezing characteristic in a rimmed ingot, the rim, or outside envelope, is very low in metalloids and the accompanying greater malleability of this very soft skin makes this type of steel well adapted for cold heading and especially for roll threading.

Automotive applications and particularly high tensile products (95,000 lb. per sq. in. and over) are more likely to call for a killed steel because the analysis is better controlled and there is less chance of a decarburized surface. One bolt company uses this type exclusively. On the other hand, a rimmed steel is sometimes used to overcome surface splitting. Surface conditions govern here also, such as the presence of seams and laps which

reveal themselves under the lateral tension created on the skin of a cold headed part. The presence of this surface tension is reason, incidentally, why members that are highly stressed in service must be heat treated after cold heading.

Then again, for some types of cold headed products the soft rimmed steel is either not hard enough in itself or does not contain sufficient carbon to provide the necessary properties in the example of certain cold headed components that are to be given a final heat treatment other than that of case hardening or cyanide hardening. In these applications, it is necessary to employ higher carbon steels—up to 0.50 C.

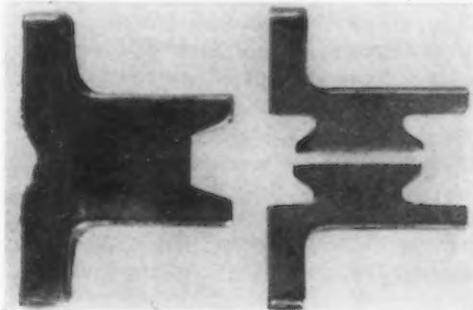
As the carbon content is increased, it frequently is necessary to introduce special features in the preparation of the wire such as "processing," normalizing, or spheroidizing. It is not unusual to find it necessary in certain very severe cold heading work to employ processed wire even in the case of very low carbon steels of the type referred to above. By processing is meant the introduction of an annealing operation just before a final light drafting in the wire mill. This procedure in the wire mill gives a much softer stock with a bright drawn finish, in the respective grades of steel, than would result from direct drawing.

Normalized wire is drawn from rods which have been given a high temperature treatment and air cool before drafting. The purpose of this anneal is to enlarge the grain size of the steel and it also results in a softening effect. Both factors probably contribute their own measure to the cold upsetting properties. Spheroidizing wire is being used more and more where difficult upsets are encountered.

Grain Size Considerations

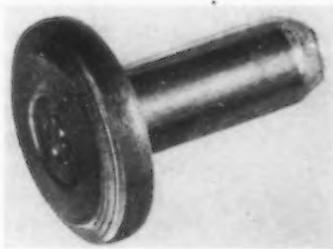
Where a given component requires steel of the higher carbon grades, for example a 1035 steel, and where those components are to be heat treated following the cold upsetting operation, it may be desirable to purchase a steel of definite grain size characteristics in order to obtain the particular type of heat treating response the given conditions may require. Some circumstances dictate a coarse grain steel and others a fine grain steel. The latter type is usually preferred where warpage in heat treatment is liable to prove a disturbing factor, particularly in the higher carbon steels, and where cracking is to be avoided. Bolts that

TWO steps in the formation of copper commutator segments. Copper strip, with a shallow V depression in each side, is fed into a two-blow cold header. In the first stroke, the strip is split endwise by a blunt tool and in the second blow, the wings are bent back to a 90-degree angle. The blanking operation is performed separately in a punch press.



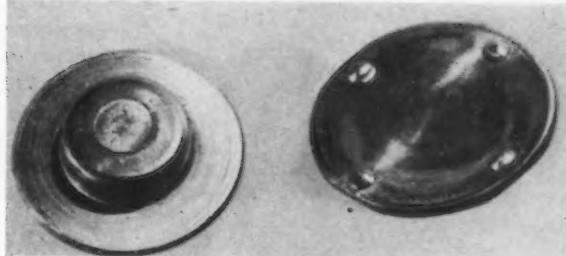
AT RIGHT

TYPICAL embossed bolt head in which a large amount of wire is forced into the head cold.



AT RIGHT

THESE two drum plugs are typical of a severe flat upset. Both are cold headed from low carbon steel wire rod 1/8 in. in diameter. The one at the right, with the projection welding nibs formed in the face, has an o.d. of approximately 1 1/8 in. and a head thickness of 3/32 in.



are made from fine grain steel require a water quench, and bolts of coarse grain steel, an oil quench. The usual practice today is to employ the former method for sizes over 7/16 in. and the latter for smaller sizes.

Coarse grain steels, Nos. 1 to 3 on the McQuaid-Ehn scale, have better plastic flow, if properly heat treated and are particularly desirable for cold heading wires of 0.30 to 0.40 per cent carbon. Rimmed steels naturally have a coarser grained outer shell, with a more refined core due to segregation of impurities toward the center of the ingot. A variation of the rimming process, however, which is called bottle top or capped steel, is a method of casting the rimmed steel in which excessive segregation is eliminated, and it is difficult to detect a skin or a core center metal. This method of casting is more desirable where cut threading is performed on the finished part, due to the fact that in thread cutting, the tool is alternately cutting the core and skin. For better machinability, the higher sulphur steels are called for.

Any cold worked material, including drawn wire, will show a finer grain than the hot rolled material from which it is fabricated; however, a coarse or fine grain steel as recorded on the McQuaid-Ehn comparison, will still be coarse or fine as far as this test is concerned, after cold working.

Wire Finish

Generally speaking, cold heading wire is of dry drawn stock, particularly in the larger sizes. In the manufacture of dry drawn wire, after the rods have been pickled for scale removal, they are given a coating of hydrated lime which is baked on the surface of the rod and it is this coating of lime which forms the base for lubrication through the cold drawing operation and also in the cold heading operations to follow. It is customary to employ a comparatively heavy lime coating which may or may not be supplemented by a sull or brown rust coating (accomplished by subjecting the clean coils to a fine water spray to accelerate rusting) prior to the immersion of the rods in the lime bath. This lime coating, or combination of sull and lime coating, is supplemented by lubricants such as special wire drawing greases or by one of a variety of metallic soaps, such as calcium or aluminum stearate, depending upon the type of work. E-P lubricants are also being used.

Several years ago, the use of heavy sull coating was quite prevalent. In recent years, however, a light sull or no sull at all is found to be most satisfactory. There are other factors to be considered, however, and the wire producers have developed various coatings to meet special requirements. Single extrusion, for example, calls for a particular coating and the double extrusion method a much heavier coating, to prevent scratching. Closed die work calls for a sull or lime coating, but for open die work sometimes a bright finish is desirable. A bright or so-called liquor finish on soft steel wire for thread rolling work produces better results with less wear on the dies, although it is not a factor in wear on heading dies. One motor car manufacturer is using a liquor finish on carriage bolts to get the corners square. Soap is an additional lubricant at the header.

In preparing liquor or copper finish wire, the wire is immersed in a solution of copper sulphate or a mixture of copper and tin sulphate, after which it is immersed in a liquor composed of fermented rye meal and yeast. When drawn through a die, such a wire assumes the bright finish of copper or copper-tin of characteristic color.

In the discussion above, only plain carbon steels have been referred to. However, many of the alloy grades of steel are also used in cold heading operation (grades such as SAE 1300, 3100 and 2300 series). Obviously, the use of many of these grades necessitates special features and operations which must be introduced in the process of wire mill operations. The type of processing necessarily depends upon the severity of the cold upsetting operation and final characteristics required in the finished component. Aside from the more simple types of cold headed bolts and screws, it would, therefore, be advisable for the manufacturer to submit his individual problems to some reliable steel maker in order to obtain the co-operation of engineers and metallurgists who are conversant with the entire problem of steel making and the application of the various types of steel to cold heading operations.

Heat Treatment of Cold Headed Products

At first thought, it would seem necessary that all cold headed products, except very small ones, should be annealed or stress relieved, but actually this is not so. The technique of steel making has progressed to the

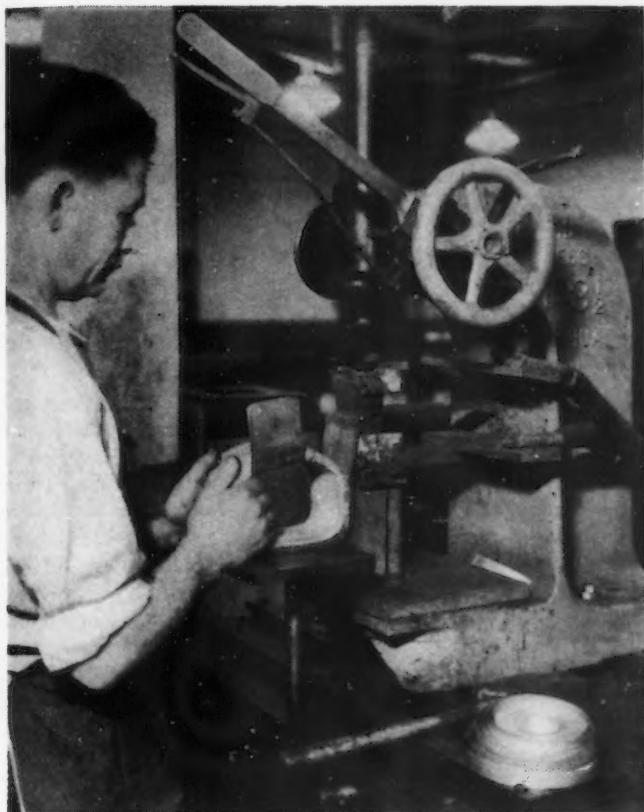
point where high internal stress can be safely carried. Much depends upon the type of product, how it will be used, how much strain is produced in the heading and how much strain will be added in service. Some companies anneal or normalize only where the presence of sharp corners may start cracks or where the part is highly stressed in a key position, such as a kingpin bolt of an automotive axle. Certain parts that are not severely upset and which may require a bright finish are not heat treated in any way. Products severely upset, on the other hand, may be given a so-called low temperature draw to relieve heading strains. Products requiring high physical properties, such as tensile and impact strength, hardness and fatigue resistance are given a complete heat treatment, including heating above the critical, quenching in oil or water, followed by a draw to the desired hardness. It is realized, of course, that cold heading and extrusion of the shank raises the surface hardness substantially due to the cold work.

Cyanide case hardening is a quite common method of treating cold headed parts subject to wear.

Controlled Atmosphere Furnaces Favored

Up until rather recently, annealing was done in atmospheric type furnaces, necessitating subsequent pickling, washing and drying operations. The latest installations, however, employ furnaces of the controlled atmospheric type, eliminating pickling. A non-oxidizing atmosphere is obtained by the partial combustion of natural, manufactured or coke oven gas. Most of the installations are electrically heated and completely conveyorized. On the other hand, the Homo batch type furnace is practically standard throughout the industry for drawing operations.

In very large work, running over 1 in. diameter stock, subsequent heat treatment is almost invariably necessary. On the truck kingpin, for example, which has been mentioned, the piece is normalized to relieve the cold work strains and then is given a cyanide case for wear resistance. Another heavy piece made by the same motor car manufacturer is later butt welded to a propeller shaft tube. The material is a 0.40 C., 0.80 Mn. steel, which is normalized at 1500 deg. F., quenched and drawn at 700 deg. to a Brinell hardness between 387 and 444. This is a typical example of a cold headed part for severe duty application.



Incandescent

Electric Carbon

Brazing Described

BRAZING primary terminal on a G-E current transformer on stationary press-type equipment.

EXPERIENCE over a period of several years has proved the merits of incandescent electric carbon brazing, said Walter Reed, General Electric Co., and Leo Edelson, Handy & Harmon Co., in a joint paper presented recently at a meeting of the Northern New York section of the American Welding Society.

Application of the new method was said to have been greatly facilitated by the development of new brazing alloys and fluxes. Brazing alloys containing silver were the only ones considered in this discussion.

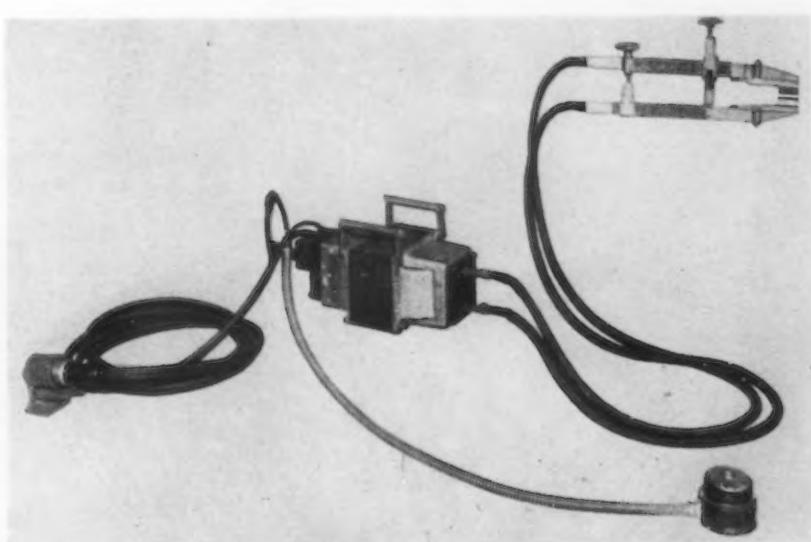
Essentially, this method of brazing consists of assembling the joint, clamping it between the electrodes of a pair of brazing tongs, and passing electric current through the work. Advantages claimed are: Less time and less cost than mechanical or soft solder joints; lighter sections of metal can be joined; joints do not require pretinning; parts can be joined close to insulation or supporting members; and length of joint lap can be reduced. When properly made, silver brazed joints stand up under thermal overload, vibration, corrosion, and mechanical and electrical stress. In addition, joints can readily be made in the field.

Alternating current is supplied to the brazing tongs directly from a transformer designed to furnish the current at the desired voltage. Ordinarily, the standard primary voltage is 220 volts; secondary voltages range from 7.5 to 12 volts.

Soft, hard, and extra hard elec-

trodes are available. While all three of these are generally made from carbon and graphite, they vary considerably in their applications and advantages. The soft electrode has a low surface resistance, thereby practically eliminating overheating the work in

(CONTINUED ON PAGE 74)



GENERAL ELECTRIC portable incandescent carbon electric brazing equipment, 10 kva.

Accuracy Essential in Cutting

IN this article, continued from THE IRON AGE of May 19, page 24, Mr. Semar discusses the inaccuracies arising from faulty succession of cutting edges of the rotating hob, faulty downward movement of the hob carriage, and faulty rotation of the blank

about its axis. Methods of checking tooth shape, condition of hob, lead-screw accuracy, and the magnitude of cyclic errors introduced by eccentricity of the worm that drives the master dividing gear and work-table are also described and illustrated.

• • •

OPERATION of the hobbing machine can be divided into three movements which completely define the surfaces formed: First, the succession of cutting edges produced by the rotation of the hob; second, the movement of the hob carriage downward, that is, parallel to the axis of the blank; and third, the rotation of the blank about its axis. Inaccuracies are similarly classified.

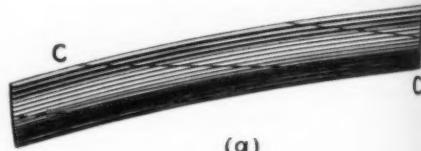
Errors in the succession of cutting edges are centered mainly in the hob

itself and in the mounting of the hob on its arbor. The gear train driving the hob has a direct effect on the accuracy of the surface, which effect is negligible when the train is reasonably accurate.

From Fig. 5 (d), it can be seen that individual hob teeth contact the surface along lines parallel to the teeth, and any errors in the cutting edges of the hob will be similarly disposed. If a single hob tooth is high, it will cut too deeply and leave a de-

pression which will extend the whole length of every tooth. A common error is a slight eccentricity in the hob thread which may be caused either by the hob itself or by its mounting on the hob arbor. About two complete revolutions of the hob are required to generate the tooth face, and an eccentricity will produce about two complete waves in the shape of the teeth. In Fig. 7 (a) the lighter lines represent the high hob teeth, and hence depressions on the tooth surface, and the heavier lines, the low hob teeth and ridges on the tooth surface.

The line *CC*, Fig. 7 (a), is a contact line, and were the tooth shape correct, contact with the mating tooth would take place all along this line.

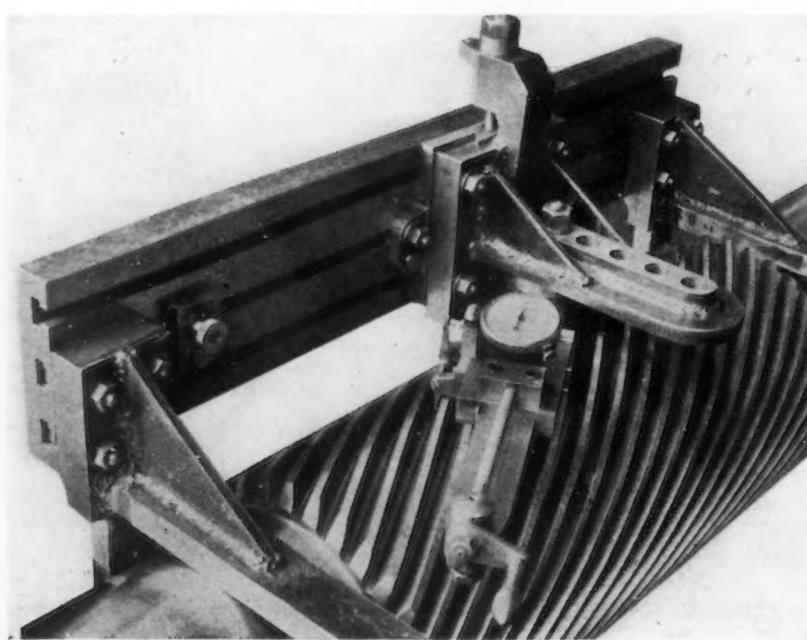


(a)

FIG. 7—Hobbing

With the "wave" in tooth shape, however, contact will be limited to the ridges. As the load is increased, the contact will be broadened due to elastic deflection of the tooth, but the loading will always be concentrated in the region of the ridges. The surface stress on which the load-carrying capacity of a gear is usually based, is reduced by this concentration of loading. Other errors in the hob and its drive have similar effects on the tooth surface and all produce a distortion of the contact line, with a resulting concentration of tooth pressure.

A convenient method of checking the accuracy of the tooth shape produced by the hob is by traversing a contact line with an indicator pointer. A fixture for making this check is



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High-Speed Reduction Gears—II

shown on Fig. 8. The travel of the indicator pointer is adjusted to traverse a contact line on the pinion tooth. As the indicator is moved along its slide, departures from the true involute surface appear as a movement of the indicator pointer. With a 0.0001-in. dial indicator, a very accurate check can be made by this method.

It is interesting to note that with a "wave" in tooth shape of 0.0005 in. or more, the ridges can be detected by eye on the machined surface, and will be the only portion of the tooth to polish when the gear is first run.

In order to produce accurate tooth form, it is necessary that the condition of the hob be known before the cut is started. The hobs are, there-

By HAROLD W. SEMAR
Mechanical Engineer, Westinghouse Electric & Mfg. Co., South Philadelphia, Pa.

• • •

in the movement of the hob downward across the face of the blank. The ways upon which the hob carriage travels must be parallel to the axis of the blank, and the downward movement of the carriage must be uniform.

If the ways are straight but out of parallel, the helix angle will be greater or less than the correct angle; if the ways are worn the helix angle will be irregular.

The axial pitch is determined by the movement of the hob carriage. If the lead-screw, which drives the hob carriage, has too great a lead, the axial pitch of the teeth will be too great and will produce on the teeth an effect similar to too small a helix angle. Irregular errors in lead likewise produce irregular error in helix angle.

The effect of a uniform error in helix angle is to concentrate the tooth loading at one edge of the face and is the same as that produced by the gear and pinion axes being out of parallel.

An irregular error in helix angle is shown in Fig. 7 (b). In this case, the polished areas on the tooth face extend in bands around the gear.

When the bands are equally spaced across the face, as in Fig. 7 (b), the cause is usually an eccentricity of the lead-screw thread or nut. Irregular bands may be caused by wear or by temperature distortions of the hobbing machine. As in the case of the hob

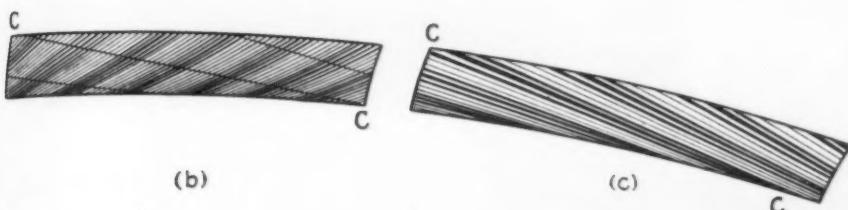
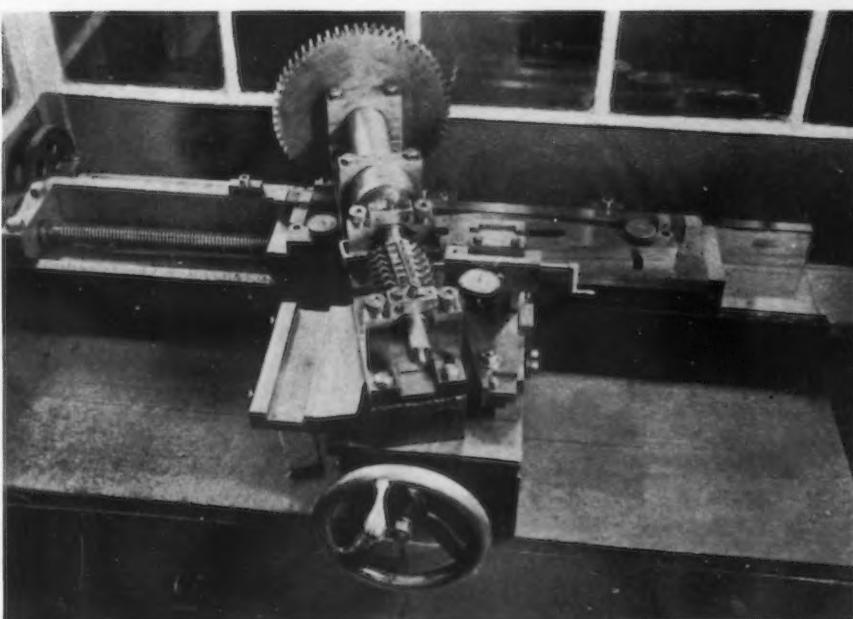


FIG. 9—Hob checking machine.

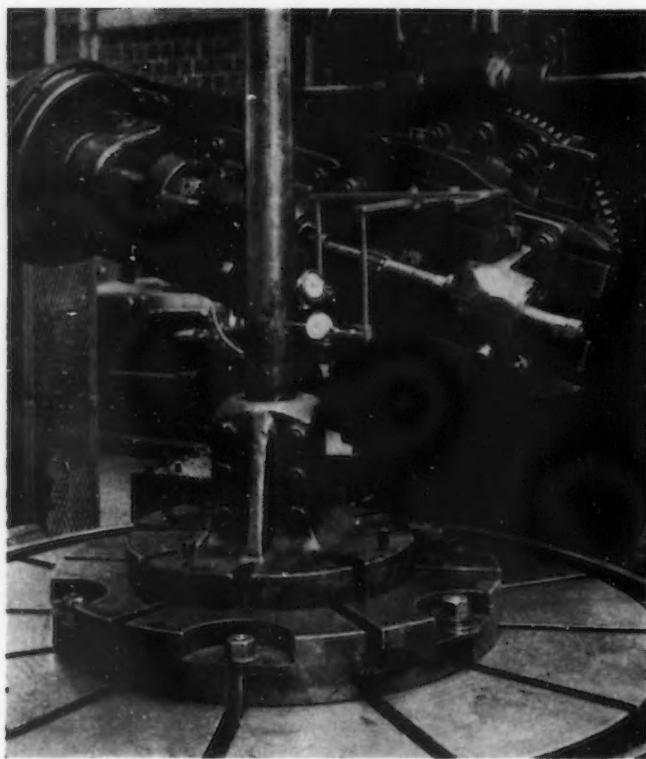


errors.

fore, carefully checked after every sharpening by the machine pictured on Fig. 9.

A location for the "center tooth" of the hob is selected, and the cutting edges are checked at the exact point and in the same sequence that they contact the gear to be cut. By this method, it is possible to maintain an accuracy of 0.0003 in. in the hobs and the same limit on the tooth shape. By "center tooth" is meant the tooth which, when mounted on the machine, will pass through the line normal to the hob and blank axes. It is used as a convenience in locating the exact sequence of teeth which form the tooth surface.

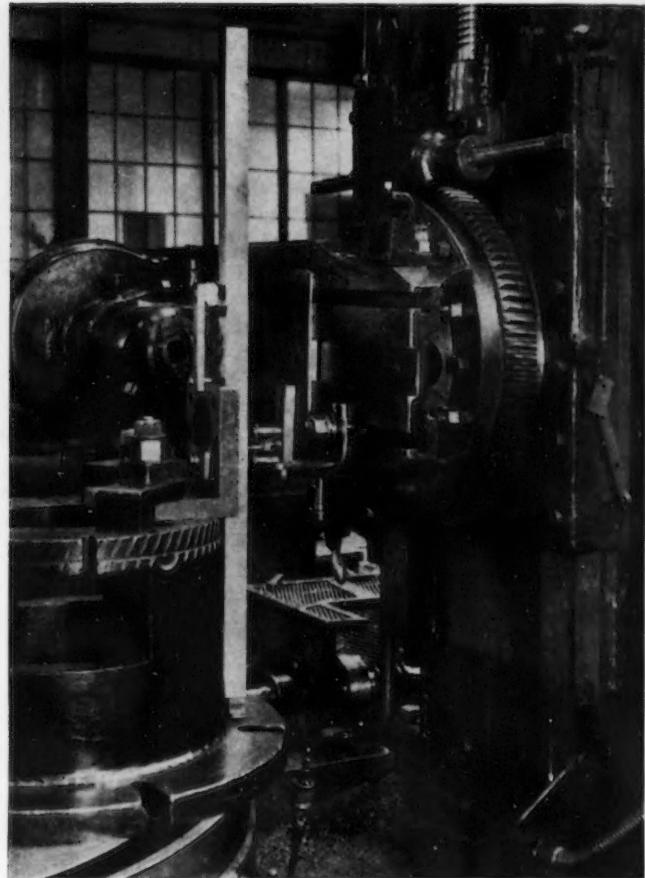
Equally important from the standpoint of load concentration are errors



AT LEFT

FIG. 10—Checking parallelism of hob travel and blank axis.

• • •



• • •

AT RIGHT

FIG. 11—Checking lead of gear hobber.

• • •

errors, the contact line CC , Fig. 7 (b), is distorted resulting in a similar concentration of tooth pressure.

The parallelism of the hob carriage ways and the blank axis can be accurately checked by the method shown in Fig. 10. A perfectly straight arbor of uniform diameter is clamped to the work table and centered so that it runs true for its entire length. The dial indicators mounted on the hob carriage with their pointers on the arbor, indicate the truth of the carriage motion as the carriage is raised and lowered.

Equally important but more difficult to measure is the accuracy of the lead-screw driving the carriage downward. An accurate measure of the actual lead can be made as pictured in Fig. 11. A steel bar with a polished face is fixed to the work-table and rotates so that a fine line is scribed upon it as it passes a carboloy-tipped pencil mounted on the hob carriage. A series of lines is scribed by successive revolutions of the table at a spacing equal to the downward feed of the carriage. The bar is removed and the exact spacing of the lines measured by means of a microscope attachment to a Pratt & Whitney measuring machine. Individual readings are accurate to within 0.0002 in. and errors of 0.0005 in. in the entire travel of the carriage can be detected. It is not sufficient merely to install precision

screws. The effect of improper counter balancing of the carriage weight and of excessive friction in the carriage ways must also be considered. All of these factors which affect the lead can be checked and measured by using the method just described.

It has been found that errors as small as 0.00025 in. per ft. out of parallel or 0.0005 in. per ft. in lead will produce errors in helix angles that will noticeably affect the contact across the tooth face on the wide faced gears used for marine propulsion. With the lead of the hobbing machine held within these limits, the gears produced will run with the teeth in contact across the entire face.

Both types of inaccuracies already discussed affect the load distribution over the tooth surface and result primarily in increased tooth surface stresses. They also are important factors in the quiet operation of the gear unit.

Errors in the rotation of the work-table are such that they repeat with every revolution of the blank during hobbing and produce the same error in all of the tooth surface at any angular position of the blank. They do not

FIG. 12—



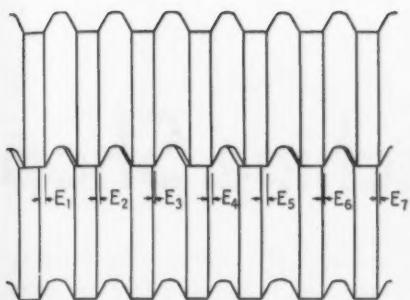


FIG. 13—Spacing errors on test gear.

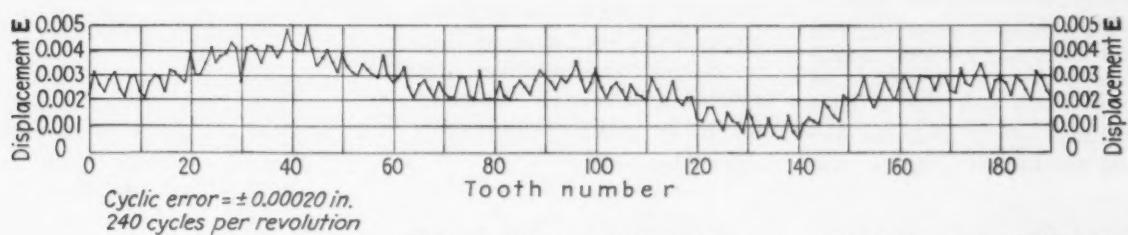
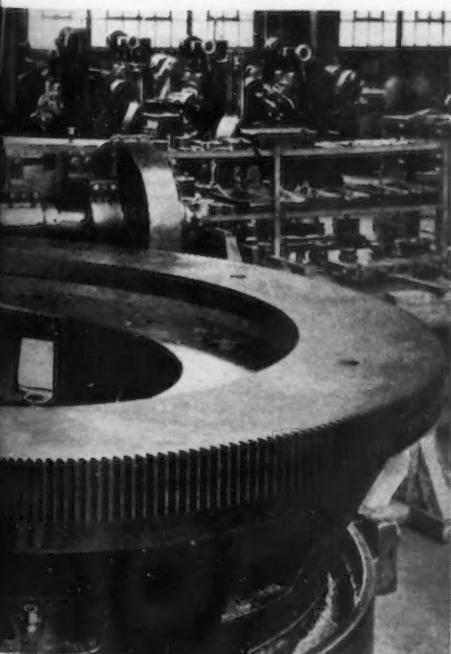


FIG. 15—Measured displace-
ments on a test gear.

affect the distribution of tooth pressure over the tooth surface, but when the gear is operated, the masses of the gear and pinion must be accelerated and retarded to accommodate the error.

Most important is the cyclic error introduced to the tooth surfaces by the eccentricity of the worm driving the master dividing gear and worktable. This error is in the form of a wave and has as many cycles in one revolution of the blank as there are revolutions of the driving worm in one

12—
Test gear.



revolution of the work-table. Usually, the driving worm has a single thread and the number of error cycles corresponds to the number of teeth in the master worm gear.

In all high speed gearing, the rate at which these cyclic errors pass through the mesh is high, and the accelerations produced by minute errors are great enough to cause the gear to emit a musical note of a pitch equal to the rate at which the errors pass through the mesh.

The fact that errors of so small a magnitude can produce an audible sound is evident when it is considered that an error of plus and minus 0.0001 in. passing through the mesh 5,000 times a second will produce an acceleration and retardation of the gear

and pinion mass of 250 times the acceleration of gravity.

Our experience at South Philadelphia has shown that lapping of a gear either with its mating gear or with a special lap affects only the contact

The location of these angular errors on the tooth surface is shown on Fig. 7 (c). The high and low portions of the tooth, represented by the heavy and light lines, coincide with the contact lines. The spacing between successive "waves" corresponds to the rotation of the surface with one revolution of the driving worm.

The magnitude of these cyclic errors can be very accurately determined by a series of measurements on a test blank such as the one pictured in Fig. 12. The blank is made up of two laminations, with a dowel and spigot fit between them so that one lamination can be rotated with respect to the other. Teeth are cut on the blank with the two halves bolted together. When one lamination is placed on the other at a position different from the one at which the teeth were cut, the cyclic errors will produce a non-uniform spacing of the teeth which will appear as shown on Fig. 13. The displacements E_1, E_2, E_3 , etc., completely around the test blank are measured to within 0.0001 in. by the instrument pictured in Fig. 14. A statistical analysis of these displacements will give the magnitude of the cyclic error. By this analysis and the large number of readings taken, the cyclic errors can be determined to within 0.00001 in. In Fig. 15 are plotted the measurements of E_1, E_2, E_3 , etc., completely around a test gear, from which the cyclic error was computed.

In order to produce quiet gearing,



FIG. 14—Instrument for measuring test gear.

errors and does not reduce the cyclic error, since lapping takes place on the low portions of the tooth as well as on the high portions.

By these methods of checking, the entire geometry of gear tooth surfaces that will be produced by the hobbing machine is known before the gear teeth are cut. The working surfaces produced can thus be maintained at a degree of accuracy which will insure the quiet operation and long life of the finished reduction gear unit.

New Aids for Machine Shop

AMONG the new pieces of equipment announced by the machine tool builders in recent weeks are found a small size radial drill with big-size features, several special types of drilling machines, a bench type band filer, a precision bench lathe, a change in design of a beveling unit for a pipe threader, not to overlook the usual number of grinding ma-

chine developments that come out month after month. These include a larger size gap type internal grinder, a large planer type surface grinder, a gear grinding machine of Swiss origin, and several kinds of floor stand grinders, together with exhaust apparatus for them and for other grinding and shop operations.

ANEW and smaller Super-Service radial drill, with 2½-ft. swing and 7½-in. diameter column, has been added to the Cincinnati Bick-

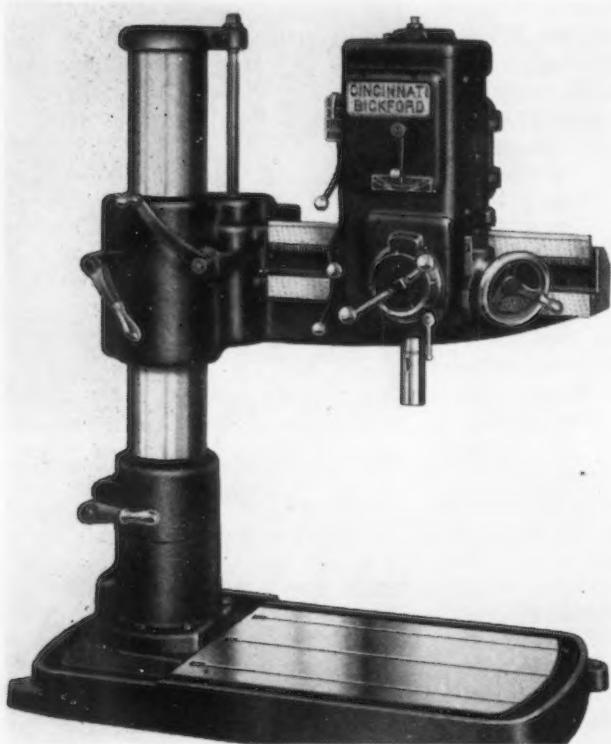
ford Tool Co. line. It is intended for small drilling and tapping in fairly large parts, and is a high speed, all geared machine adaptable to the pro-

duction line. Three or six speed changes can be had instantly, depending upon whether a constant speed or a two-speed motor is used. Different ranges can be obtained through change gears, readily accessible. Three rates of power feed are also available.

Heat-treated chrome nickel gears are used in both the feed train and in the spindle drive. They are spline mounted, and the shafts are carried on anti-friction bearings. The spindle is mounted on precision anti-friction bearings, and the spindle sleeve is extra long. Drive is by a 1-hp. totally enclosed reversing motor mounted on the rear of the head. The head is carried on ball bearing rollers running on a

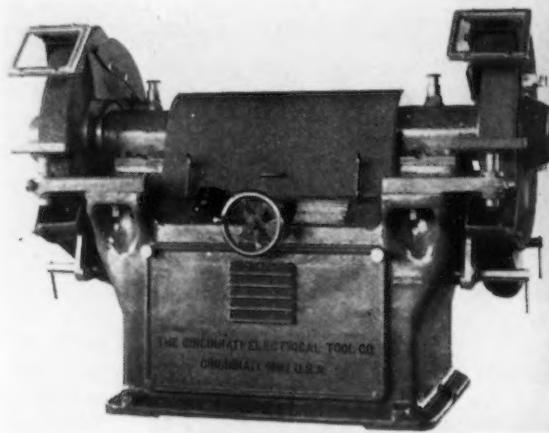
BELOW

ASMALL size Super Service radial drill with 2½-ft. swing and 7½-in. column has been added to the Cincinnati-Bickford line.



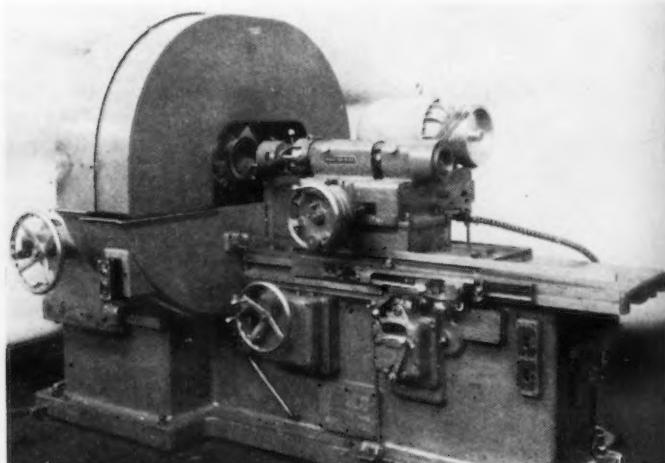
AT RIGHT

BY the use of raising blocks under the work head, a 50-in. faceplate has been applied to the new No. 174 Heald gap type internal grinder, largest of the series and normally of 42-in. swing capacity.



ABOVE

ADJUSTMENT of the spark shields by handwheel in front to compensate for wheel wear automatically changes the variable pitch sheaves to give a uniform peripheral wheel speed in this new snagging grinder.



Practice

hardened steel armway. Elevation of the arm is manual, since it is seldom necessary to change the arm height in a machine of this size.

Duplex Drilling Machine

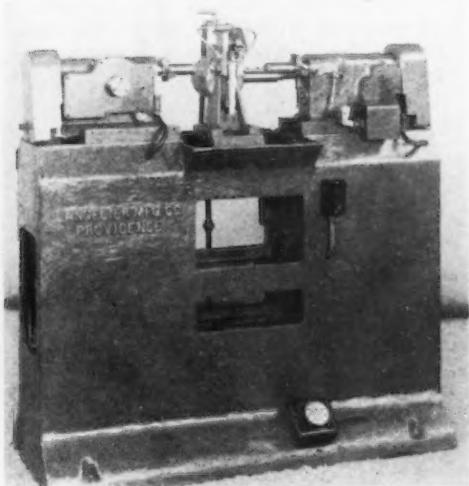
Typical of the many special-purpose machines built up with standard unit heads is a horizontal duplex

drilling and counterboring machine made by the *Langelier Mfg. Co.*, Providence, for finishing holes in ice tray handles. The two No. 11 cam fed units are driven by V-belt from motors mounted in the base. Electrical controls synchronize the heads, and the right-hand head acts as the control for the automatic clamping fixture. The parts are loaded by hand, but are

ejected automatically. Lubricant is supplied by a motor driven pump in the base. Production rate is 750 pieces per hr.

Automatic Driller and Tapper

DOUBLE DRIVE-MATIC is the name of a new type automatic drilling and tapping machine for small



ABOVE

THIS Langelier duplex drilling and counterboring unit has two standard heads, driven by V-belt, and a special automatic clamping fixture.

BELOW
THE new Hisey Tex-drive wet grinders employ a self-priming pump driven by V-belt from the wheel spindle.



ABOVE
THE Royce double Drive-Matic combines drilling and tapping on small work carried in an indexing dial table.

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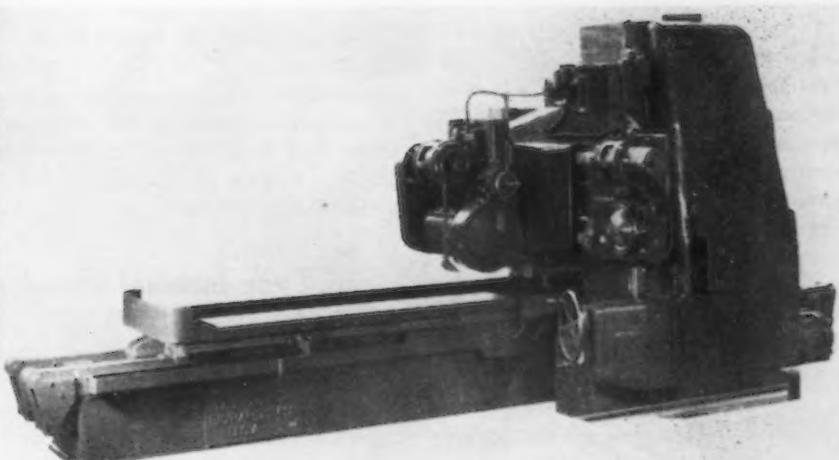
BELOW

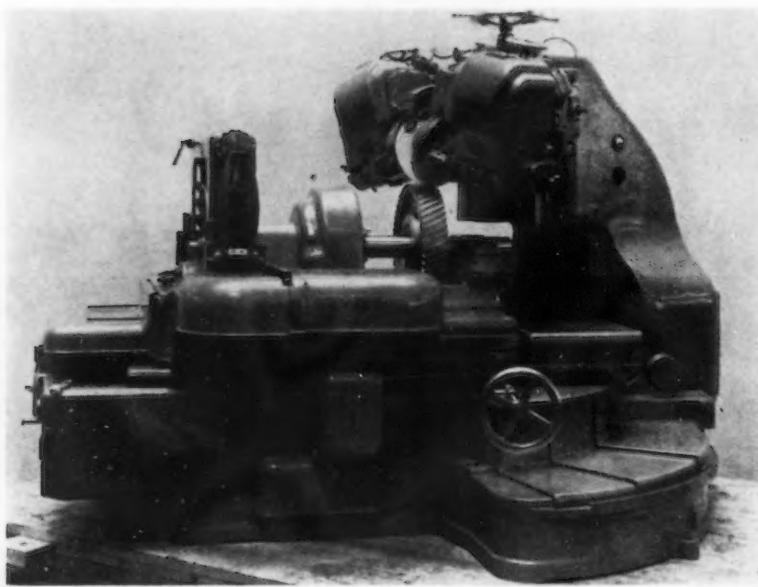
A HANCHETT planer type surface grinder with straight wheel has been built with a finished table surface $2\frac{1}{2} \times 8$ ft. Weight is 45,000 lb. net.



ABOVE

THIS new size Continental band filer is only 32 in. high.





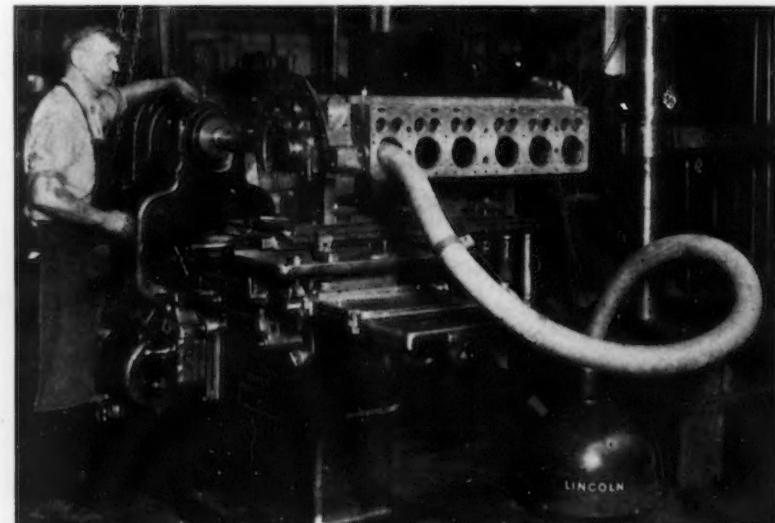
TYPE HSS-60 Maag gear grinding machine will finish spur and helical gears up to 24 in. o.d. Other types will accommodate gears from 1 to 12 ft. in diameter.

metal parts. Production is 1200 pieces an hr. for the two operations, or 2500 an hr. for one operation only, according to the manufacturer, the *Royce Machine Co.*, 2418 W. Madison Street, Chicago. Work is loaded in a revolving turntable having 12 "Lock Jaw" chucks. In the first work station, the piece is drilled, in the second, it is tapped and is ejected by air when it is indexed to the third station. A universal type of chuck enables almost any shape up to $\frac{3}{4}$ -in. diameter to be held without the use of additional fixtures. The heads are driven independently by cam drives synchronized with movement of the dial table. The entire mechanism is enclosed in a streamlined housing to afford maximum safety and to minimize floor space.

Band Filer

A SMALL size, portable band filer has been added to the line of the *Continental Machine Specialties, Inc.*, Minneapolis. It stands 32 in. high, weighs 150 lb. and is driven by V-belt from any $\frac{1}{4}$ -hp. motor mounted at the rear. Work table is 12 in. square and tilts in two directions. A gear reduction transmission gives speed variations to the rubber faced driving pulley for the file band. All working parts are enclosed and sealed ball bearings are used throughout.

The bands furnished are of the latest type, and when they are not flexing over the pulleys, the file segments in-



THE Linconditioner is a fan type exhauster with integral filter suitable for removing dirt from the air surrounding grinding, welding and other shop operations.

terlock securely. Files are available in $\frac{1}{4}$ and $\frac{3}{8}$ in. widths and in various shapes and cut to handle anything from plastics to high-carbon steel. The machine will file a surface up to $5\frac{1}{2}$ in. thick. Complete details may be had in bulletin No. BF-43.

Gap Type Internal Grinder

A NUMBER of novel features are found in the No. 174 adjustable gap internal grinding machine, having a swing up to 42 in. in diameter and supplementing the No. 172 machine of 36-in. swing made by the *Heald Ma-*

chine Co., Worcester, Mass. The new size has a capacity for internal bores up to 20 in. The end of the machine base is stepped down and is provided with two flat ways on which the bridge holding the workhead can be moved to adjust the length of the gap. The work guard is also adjustable for various lengths of workpieces and is actuated hydraulically. Workhead spindle runs in large pre-loaded anti-friction bearings.

The wheelhead is interchangeable with that of the No. 74 line. Spindle is mounted on matched precision bearings and is driven by flexible coupling from a belt driven jackshaft to eliminate chatter from belt pulsations. Table movement is by hydraulic power, and speeds can be varied up to 32 ft. per min. A wheel truing device is incorporated, enabling the diamond to true the wheel just before the finish size is reached. The main table ways

are protected at all positions by two stationary shields.

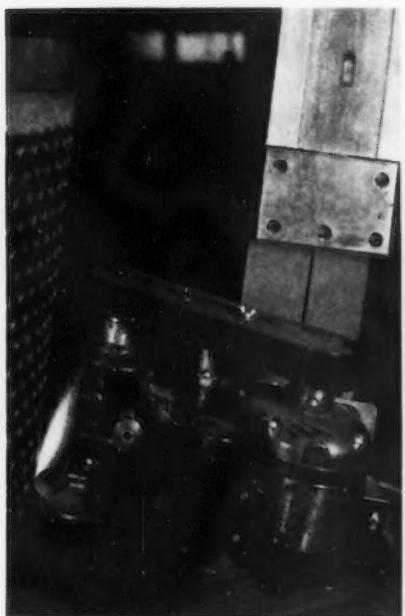
Planer Type Surface Grinder

A NOTHER large size planer type surface grinder, similar to the one described last month (*THE IRON AGE*, May 19, p. 28), but employing a straight wheel of 20 in. diameter and 3 in. face, has been announced by the *Hanchett Mfg. Co.*, Big Rapids, Mich. The dimensions of the finished table top are 30x96 in. and the distance under the wheel is 20 in. Bed is 23 ft. long, and table speeds up to 90 ft. per min. are available by hydraulic power.

Power elevation to the rail is supplied by a 3-hp. motor and a separate 5-hp. motor gives a constant cross feed to the wheelhead of 30 ft. per min. or automatic cross feed in steps from $\frac{1}{8}$ to 5 in. per table traverse. The grinding wheel motor may be either 15 or 20 hp. Force feed lubrication is supplied the table ways through a small motor driven pump.

Snagging Grinder

THE Cincinnati Electrical Tool Co., division of the R. K. LeBlond Machine Tool Co., Cincinnati, has announced a new variable-speed snagging grinder in which movement of the wheel guards is synchronized with changes in adjustable pitch sheaves so



These Tex-drive grinders are self-contained, with built-in pump driven by V-belt from the grinder spindle and with a large, concealed reservoir. Flow of water is controlled by a valve on top of the wheel guard, and a separator removes grit from the water so that it can be recirculated. The splash bowls are designed to catch all the water, yet not restrict freedom of operation in grinding long or odd shaped work. Machine can be supplied with or without motor, 3 or 5 hp., according to wheel size.

Gear Grinder Machines

THE Triplex Machine Tool Corp., 125 Barclay Street, New York, is placing on the American market a new line of helical and spur gear grinding machines made by the Maag Gear-Wheel Co., Ltd., of Zurich, Switzerland. These machines employ two saucer shaped wheels which form the sides of a basic rack, and the work gear is rolled under the wheels by means of circular pitch blocks about which steel bands are wound. The outer edges only of the wheels touch the tooth flanks at two points and in combination with the cross feed produce

characteristic criss-cross marks on the teeth. One of the most important features of the machines is the compensating mechanism which repositions the wheels every 3 or 4 sec. if need be to allow for wheel wear.

The dividing mechanism is mounted on the generating slide and brings one tooth after another into position. The operation is performed in two motions, the first (an approximate one) by means of change gears; the second, by means of accurate dividing plates. After roughing out work, the generating motion is stopped automatically to allow inspection and changes in feed.

These Maag machines are made in eight sizes, the smallest with a range up to 12 in. o.d., and the largest, up to 12 ft.

Exhauster Units

AN air exhauster which is said to filter out about 95 per cent of the dirt from air in the vicinity of grinding, welding and other shop operations has been placed on the market by the Lincoln Electric Co., Cleveland. The Linconditioner consists of a fan driven by a $\frac{1}{2}$ -hp. motor, a filter in the periphery of the power unit and 10 ft. of

AT LEFT

A DUMORE No. 12 grinder was satisfactorily applied to grinding several 43-in. tapered cast iron strainer cores on a 16-ft. boring mill at Love Brothers, Aurora, Ill. Overcoming the wheel dressing effect of the hundreds of holes involved the selection of the proper wheel bond, speed and feed.

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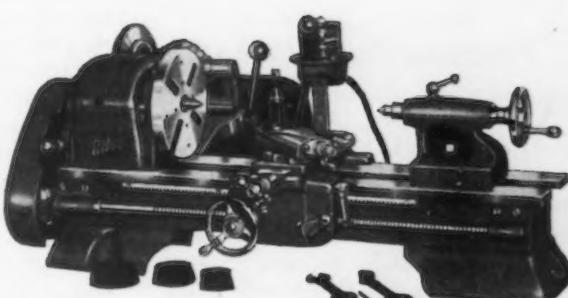
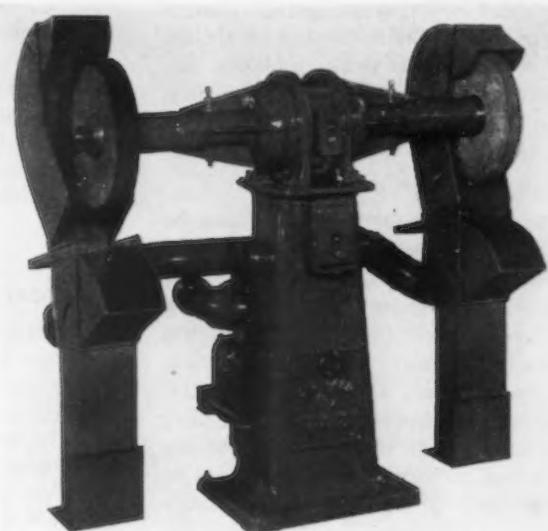
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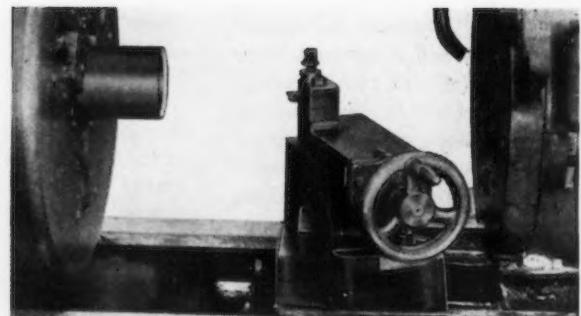
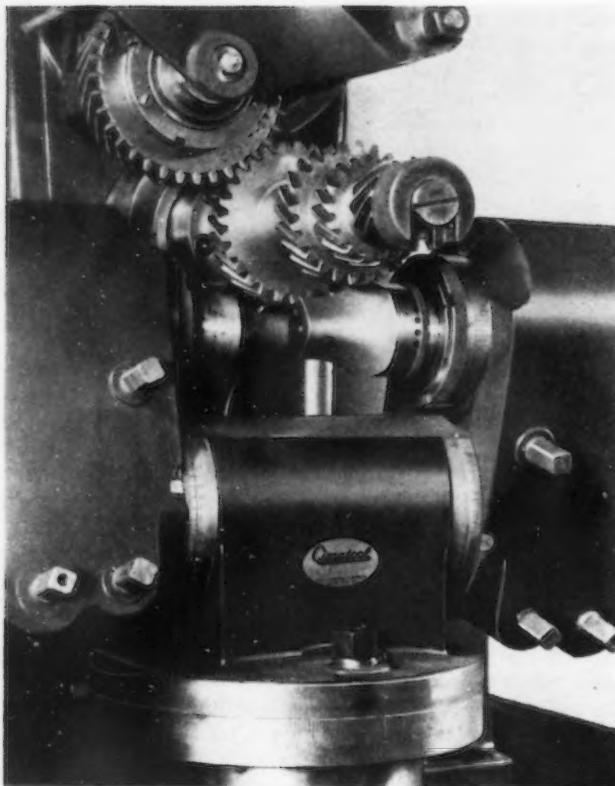
ADJUSTABLE hoods, piping and exhaust fan shown applied to a "Standard" 2-hp. pedestal type buffing and polishing machine can be applied equally well to any pedestal type grinder or buffer.

• • •

LOWER RIGHT

THE Atlas precision lathe is a back geared, screw cutting bench type swinging work up to 6 in. in diameter.





ABOVE

THE new beveling unit for Landis pipe threading and cutting off machines is now carried in front of the carriage instead of in back of the threading head.

• • •

AT LEFT

FLY cutters are used on the two opposed cutter spindles in the new Cimatool No. 2-B burring machine.

standard flexible tubing. For welding operations, the tubing is supported by a welded steel arm and spring arrangement so that the nozzle can be shifted as needed. There is also a blower outlet, normally covered by a cap, that can be connected to the hose when it is desired to blow away smoke and heat, as in welding inside tanks.

Exhauster equipment that can be attached to the back of pedestals of grinding, buffing and polishing machines is announced by the *Standard Electrical Tool Co.*, 1946 W. Eighth Street, Cincinnati. The exhaust blower is powered by a 3600-r.p.m. ball bearing motor controlled by a separate push button manual starter, incorporating overload protection, or the unit can be controlled through the buffer motor starter. Adjustable hoods and piping are provided, and an air filtering stand can be furnished.

Precision Bench Lathe

A RECENT development for small part machining is a back-geared, screw cutting lathe made by the *Atlas Press Co.*, Kalamazoo, Mich. The new lathe swings work up to 6 in. diameter and is available in two bed lengths with 12 and 18 in. capacity between centers. Among the features are: reversible

power feeds for carriage; complete V-belt drive; Timken bearings on the spindle; integral countershaft; 16 speeds, and thread cutting range from 8 to 96 th. per in., right or left hand. A drum type reversing switch, cords and mounting brackets are furnished as standard equipment. A complete line of tools and attachments is available. Details are given in catalog No. 29.

Gear Burring Machine

UTILIZING a fly cutter on each of its two horizontal, opposed cutter spindles, the new model 2-B burring machine, made by the *Cimatool Co.*, Dayton, Ohio, will burr gear teeth accurately at speeds up to 800 teeth per min., on both sides of gears up to 8 in. o.d. The cutter spindle mounts are vertically adjustable on a column, and the spindles may be adjusted laterally and from front to rear. The work gear is driven by an idler, which swings upward and to the left to accommodate different sized gears.

Both cutter spindles and idler are driven through constant mesh gears and the movements are synchronized so that the machine cannot get out of "time." A quick change timing adjustment is incorporated. Only a change in pitch makes necessary a

change in the idler gear. Clamping of the work may be by manual, hydraulic or air operated fixture. Automatic cycle control stops the spindle in such a position that there is no interference from the cutters. Timken bearings are used throughout.

Beveling Attachment

A MODIFICATION has been made in the design of the beveling attachment for pipe threading machines made by the *Landis Machine Co.*, Waynesboro, Pa. Instead of placing the beveling unit back of the threading head, the new unit is placed in front so the cut can be made with the pipe overhanging the chuck jaws only a relatively short distance. In the former construction, the out-of-round condition of the pipe made even a pipe support ineffective in obtaining a bevel sealing surface. The beveling assembly is pivoted on a base cast as a forward projection of the die head carriage. It has a graduated scale to show the bevel angle, and movement is by handwheel and screw.

Limit Switch for Planer

A NEW limit switch for application where an intermittent feed or index function is regularly repeated, such as for the feed of planers, plate planers or roll grinders, has been announced by the industrial department of the *General Electric Co.* Essentially, the switch consists of a drive shaft connected to the feed mechanism, an indexing means for setting the amount of feed to be obtained at each individual operation; and a resetting mechanism for automatically bringing the switch to the zero position after each operation has been completed. The indexing mechanism also includes an arrangement for positively locking it in any selected position.

Effect of Chromium

By REBECCA HALL SMITH

Metallurgist, Detroit

on Growth of

Commercial Cast Iron

THE author herein outlines the history of investigations on growth of cast iron at elevated temperatures, describes her investigation of the subject, and presents micrographic evidence on the retarding effect of chromium on growth of cast iron.

IT seems that when the household furnace breaks down, it is always zero weather; and when stoker links or industrial furnace parts burn out and must be replaced, there is always a rush order on hand. Probably every one has been seriously inconvenienced, at one time or another, by the failure of iron castings which have been exposed to high temperatures. In this connection there are two questions of interest to all metallurgists; that is, what causes the deterioration of iron after exposure to elevated temperatures, and what can be done about it? Gray iron foundrymen are especially concerned, because they want not only to give good service to those already using cast iron, but also, wherever possible, to extend the field of applications for this material.

¹ "Growth of Cast Iron After Repeated Heatings," by H. F. Rugan and H. C. H. Carpenter, *Journal Iron and Steel Institute*, vol. 80, p. 29, 1909.

So, ever since Beddoes first noticed in 1791 that cast iron undergoes a permanent growth after exposure to high temperatures, people have been trying to explain and prevent this growth. That their efforts have been largely successful is apparent from the constantly decreasing number of failures of cast iron in high temperature service. However, as in every other instance of attempted progress, many things have been tried which have not proved beneficial.

It has been the author's aim to study one of the commercial cast irons which is now giving good service at high temperatures, the object being to find just what is the difference between this and an ordinary grade of good cast iron, and to get some explanation as to why this iron does give good service. Fortunately, samples of both ordinary and special iron were available from a foundry which had just run extensive high-

temperature tests on the two types of iron.

The effects of exposure of ordinary gray iron to temperatures above about 800 deg. F., especially under conditions of alternate heating and cooling, are well known. First, there is an increase in volume, accompanied by loss of strength and toughness. In some cases, this growth is so marked that the castings become warped and completely useless. Then, at high temperatures (and depending also upon service conditions) there is often oxidation and scaling. Sometimes, the whole casting becomes oxidized and eventually disintegrates.

Of course, the first question which comes up, is what causes cast iron to grow? Probably everyone who has studied this problem has a different opinion. The first workable theory was advanced in 1909 by Rugan and Carpenter¹, who after a series of careful tests, decided that growth was due to oxidation of the silicide of iron, forming more bulky compounds than those originally present. They thought the oxidizing gases penetrated into the interior of the casting along the graphite flakes, and therefore assumed that free graphite was necessary for growth. As contributing causes, they mentioned (1) the decomposition of cementite, producing ferrite and more graphite, and (2) the



FIG. 1.—Structure of ordinary iron: (A) as cast, unetched, X 100; (B) after heating, unetched, X 100; (C) after heating, etched 2 per cent Nital, X 100; (D) after heating, unetched, X 500; and (E) after heating, etched 2 per cent Nital, X 500. . . .

pressure exerted at high temperatures by gases either originally dissolved in the iron, or occluded in it.

Okochi and Sato² studying the problem of growth some ten years later, discounted the effect of oxidation. They felt that the growth which takes place at the first heating is due to the decomposition of combined carbide; but that afterward, the increase in volume is caused by the pressure of gases which penetrated into the casting at lower temperatures, along the graphite flakes.

Kikuta³ brought out another factor, which is that different constituents of cast iron have different rates of expansion and contraction. Therefore, when cast iron is alternately heated and cooled, even in a vacuum, stresses are set up between the different micro-portions which result in minute cracks or fissures, and ultimately, in increased volume.

Ever since the researches cited above were published, the theories of growth have mentioned these same factors. The majority of investigators seem to agree with Rugh and Carpenter that oxidation is the principal cause of growth, especially under commercial conditions: see Andrew and Hyman⁴, Higgins⁵, Pearson⁶, Andrew⁷, and Donaldson^{8 and 9}. Others, while agreeing that oxidation is an important factor, also emphasize the expansions and contractions which iron undergoes on being heated and

² "Growth of Gray Cast Iron," by M. Okochi and N. Sato, *Tohoku Imperial University Journal*, vol. 10, p. 3, 1920.

³ "Growth of Gray Cast Iron During Repeated Heatings and Coolings," by T. Kikuta, *Tohoku Imperial University*, vol. 11, p. 1, 1922.

⁴ "High Temperature Growth of Special Cast Irons," by J. H. Andrew and H. Hyman, *Journal Iron and Steel Institute*, vol. 109, p. 451, 1924.

⁵ "Dilatation of Cast Iron During Repeated Heating and Cooling Between 15 Deg. and 600 Deg. C.," by R. Higgins, *Carnegie Scholarship Memoirs*, vol. 15, p. 217, 1926.

⁶ "Growth of Commercial Gray Cast Iron," by C. E. Pearson, *Carnegie Scholarship Memoirs*, vol. 15, p. 281, 1926.

⁷ "Growth of Cast Iron," by J. H. Andrew, *Foundry Trade Journal*, vol. 35, p. 518, 1927.

cooled: see Benedicks and Lofquist¹⁰, LeThomas and LeRomancer¹¹, and DeWans and DeNoel.¹² Additional references are given at the end of this article, in case the reader wishes to go into the matter more thoroughly.

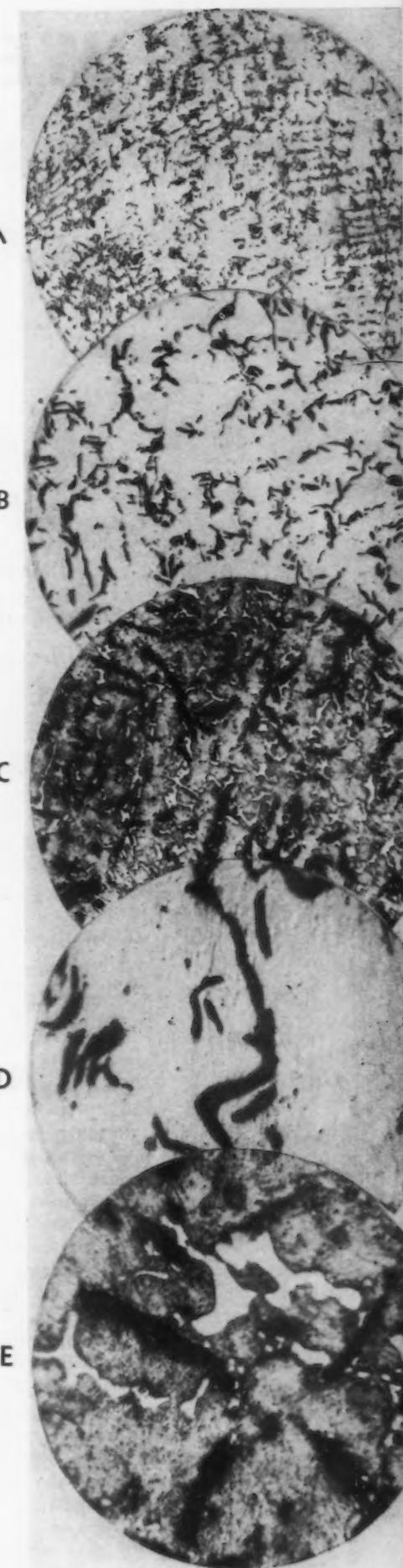
The present author felt that a careful microscopic comparison of an iron giving good service at elevated temperatures, with one which was not satisfactory, might bring out some new ideas on the subject of growth. It might also provide some definite information in regard to the familiar statement that "carbide-stabilizing elements retard the growth of gray iron," as to why this statement is true, and what it means in service.

As stated above, this study was made on commercial castings, some of which had already been extensively tested at high temperatures by the producing foundry. The unalloyed iron was a good quality cupola iron, containing approximately 3.30 per cent carbon, 2.40 silicon, 0.60 manganese, 0.25 phosphorus, and 0.10 per cent sulphur. The alloyed iron contained, in addition to the elements given above, approximately 1.00 per cent chromium.

To determine the comparative resistance to heat, samples of these two types of iron had been subjected to 60 successive 5-hr. cycles at 1700 deg. F., in an atmosphere of oxygen. These conditions are more severe than would be met in the field, since iron of this composition is not recommended for service above 1400 deg. F., and would hardly be used in an oxygen atmosphere. Of course, the growth and deterioration are much more rapid under the test conditions, than would be the case in an industrial application at say 1350 deg. F. in air.

Tensile tests made before and after heating showed that in the as-cast condition, the chromium iron had about 40,000 lb. per sq. in. tensile strength, while the unalloyed iron had about 30,000 lb. per sq. in. After exposure of 1700 deg. F. for 300 hr., the chromium iron still had (when tested at room temperature), a tensile

FIG. 2—Structure of chrome iron: (A) as cast, unetched, X 100; (B) after heating, unetched, X 100; (C) after heating, etched 2 per cent Nital, X 100; (D) after heating, unetched, X 500; and (E) after heating, etched 2 per cent Nital, X 500.



strength of 40,000 lb. per sq. in. The unalloyed iron had dropped to 10,000 lb. per sq. in. Other investigators have run strength tests at high temperatures, which show that the chromium iron retains a much larger proportion of its as-cast strength at elevated temperatures than does ordinary iron (MacPherran and Krueger)¹².

Visual examination showed that the alloyed iron had grown hardly any, while the ordinary gray iron had grown and warped badly. This conclusion was confirmed by length and width measurements, which showed that the chromium iron grew less than one-third as much as the ordinary iron. Moreover, the chromium iron still had a good close fracture after heating, but the ordinary iron was very porous.

The test results mentioned above confirmed the data already obtained from experience, and showed that chromium does have a marked retarding effect on the growth of cast iron at elevated temperatures, and on its consequent loss of strength. This microscopic examination was undertaken in an effort to find out why this element behaves in this manner.

The structure of the two irons in the as-cast condition are shown in Figs. 1 and 2. The ordinary cast iron (Fig. 1a—unetched, X 100) is a close-grained iron with sharp, well-defined graphite flakes in a pearlitic matrix. The chromium cast iron (Fig. 2a) is very similar in appear-

^{8 and 9} "Heat Treatment and Growth of Cast Iron," by J. W. Donaldson, *Foundry Trade Journal*, vol. 35, p. 518, 1927; "Heat Treatment and Volume Changes of Gray Cast Iron Between 15 Deg. and 600 Deg. C.," by J. W. Donaldson, *Foundry Trade Journal*, vol. 39, p. 315, 1928.

¹⁰ "Theory of the Growth of Cast Iron Repeatedly Heated," by C. Benedicks and H. Lofquist, *Journal Iron and Steel Institute*, vol. 115, p. 603, 1927.

¹¹ "Manufacture of Heat Resisting Irons," by LeThomas and LeRomancer, *Foundry Trade Journal*, vol. 47, p. 319, 1932.

¹² "Heat Resistant Cast Irons," by A. DeWans and L. DeNoel, *Revue Universelle des Mines*, vol. 10, p. 572, 1934.

¹³ "Effects on Cast Iron of Prolonged Heating at 800 Deg. to 1100 Deg. F.," by R. S. MacPherran and R. H. Krueger, *Transactions American Foundrymen's Association*, vol. 38, p. 826, 1930.

ance and structure, except that there are a few unbroken carbides present.

After heating, both irons show evidence of graphite-enlargement, but the ordinary cast iron shows much more graphite growth, and some oxidation besides (Fig. 1b, ordinary iron; Fig. 2b, chromium iron; both unetched, X 100). Etching brings out the difference even more strongly. In the ordinary cast iron, it is clear that the graphite flakes must have served as channels for the entrance of oxidizing gases (Fig. 1c) for there is now a network of oxide and graphite throughout. The chromium iron, on the other hand (Fig. 2c), not only does not show oxidation, but seems to have retained the same structure as before heating. The stable chromium carbides persist unbroken, in spite of 300 hr. at 1700 deg. F. The graphite also retains its original shape, without the ragged appearance seen in the ordinary iron.

At higher magnifications, this difference between the two irons is more marked. The ragged, swollen appearance of the graphite in the ordinary iron is very noticeable, even in fields originally containing very small flakes (Fig. 1d). In the chromium iron, the graphite is still sharp and well-defined (Fig. 2d). Photomicrographs of samples etched in 2 per cent Nital, X 500, show gray patches of oxide, presumably products of the oxidation of silico-ferrite, in the ordinary iron (Fig. 1e). Silico-ferrite, which is easily oxidized, is probably a decomposition product of the pearlite originally present in this iron. An interesting point is noted in the chromium iron, for the pearlitic matrix is seen still persisting in spite of long exposure to temperatures far in excess of the decomposition temperature of unalloyed pearlite (Fig. 2e).

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E.D. NOTE: In a following issue the author will present her ideas on growth of cast iron, and sketch the effects of chromium on growth.

THIS WEEK ON THE

By W. F. SHERMAN
Detroit Editor

ASSEMBLY LINE

- ... **Detroit City Council weighing plan for industrial peace board . . . Summer shutdown rumors discredited**
- ... **Huge wheat crop expected to spur farm truck buying**
- ... **Fifty automobile executives indicted by Federal grand jury.**

DETROIT.—A proposal for an industrial peace board similar to the plan operating in Toledo has been approved in principle by the Detroit Common Council. Next Tuesday night, public hearings on an ordinance to create a peace board will be held by the council.

Six weeks ago, when a new strike wave hit Detroit, resort to the Toledo plan was suggested in this column (ASSEMBLY LINE, April 28, 1938).

The Detroit plan, proposed by Mayor Richard W. Reading, is similar to the Toledo plan, with one outstanding difference which already has aroused a storm of protest from labor groups. While the Toledo board consists of five men each from management and labor, and eight from the public, the Detroit board would have 24 members, six from the labor groups and six each representing management, stockholders and public.

The Toledo formula stresses the fact that the board members represent the community at large, rather than any faction or group, while the tenor of the Detroit proposal is such as to emphasize the distinctness of each group. Labor opposes as a "joker" the plan to give separate representation to management and in-

vestors, contending that employers would have 12 representatives as against six for labor groups. It is a rock upon which the plan might easily split.

The success of the Toledo plan is attributed to several circumstances which Detroit must remember:

It was made patently clear in Toledo that not all the faults were to be charged to labor.

Board members serving in Toledo have to all appearances put community interests above group loyalties, whether they, individually, represented labor or management.

The machinery was put into motion by Edward F. McGrady, who was Assistant Secretary of Labor, and had won trust of labor and capital.

Public opinion was mobilized behind the plan. Newspapers supported it strongly, and the loser, after a board decision, was not put in an embarrassing position because the board operated with a minimum of publicity.

In Toledo, when the plan was proposed early in 1935, neither labor nor management was at first friendly. Organized labor was fearful of trick-

ery; employers feared that they were putting themselves at a disadvantage by agreeing to the proposal.

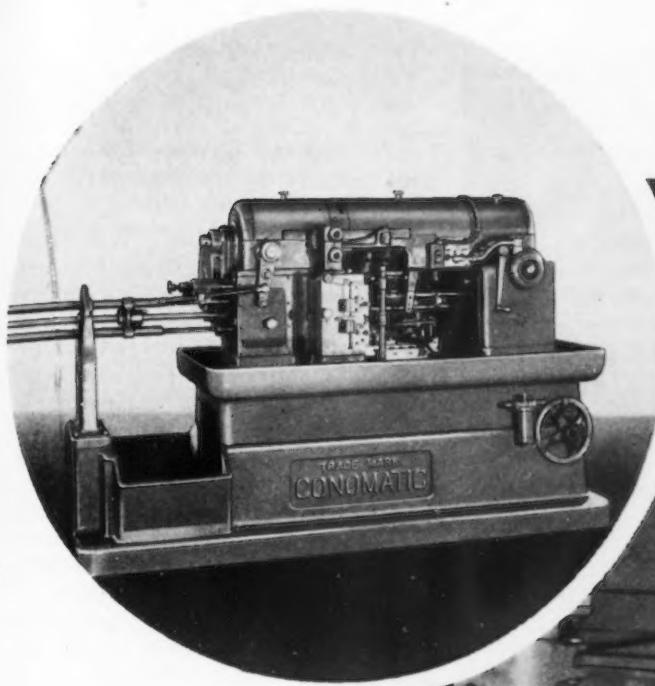
However, its success recommends further trials: Four out of every five labor disputes have been settled without difficulties; violence has disappeared, and Toledo is enjoying industrial peace far greater than it had three years ago.

Production Slumps

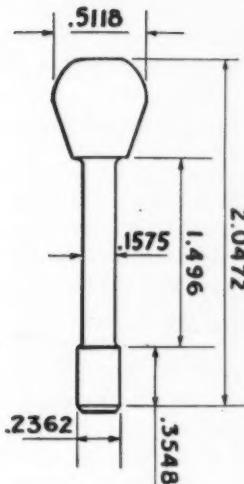
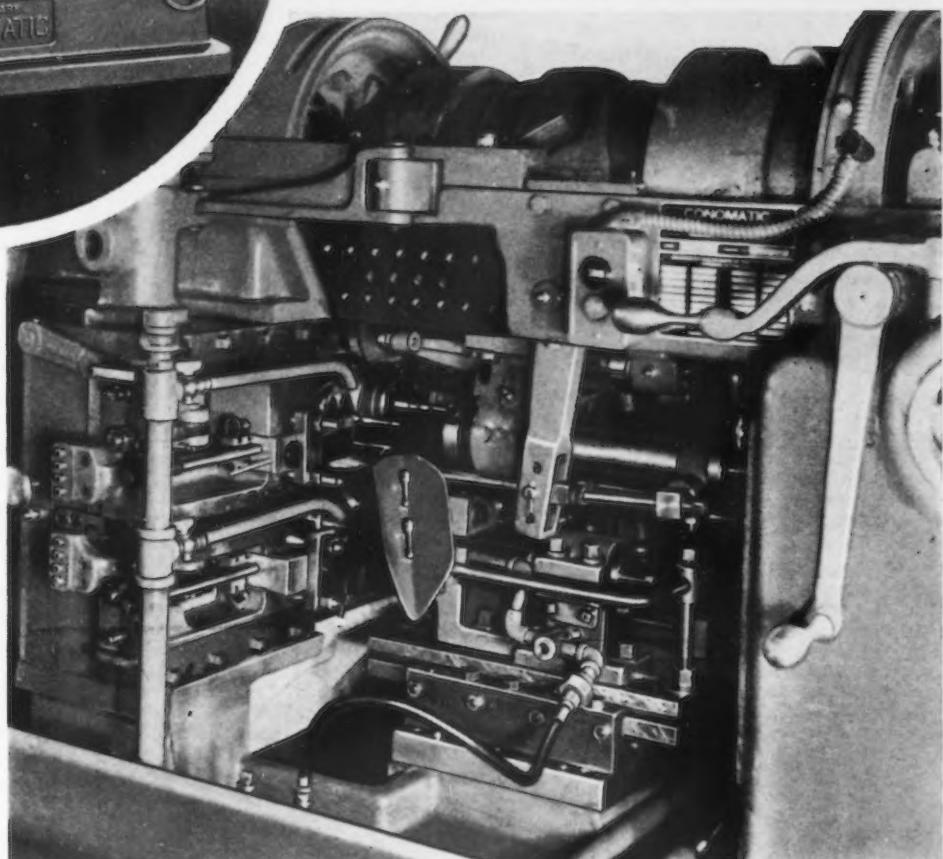
Ford's week-long shutdown and production lost in other automobile factories because of the Memorial Day holidays reduced output last week to 26,980 units, compared with 45,120 the previous week and 104,136 a year ago, according to estimates released by Ward's Automotive Reports. Schedules projected for this week will result in about 40,000 assemblies, it is believed. While registration figures of the R. L. Polk & Co. showed automobile sales strength spotted throughout the nation, Hudson reports important gains during the last week of May, concentrated in the well populated Eastern and Mid-western sections of the country. Among the gains cited are:

New York	10%
Philadelphia	17%
Cleveland	120%
Cincinnati	25%
Denver	90%
Kansas City	45%
Minneapolis	60%
Pittsburgh	108%
St. Louis	80%
Seattle	27%
Syracuse	110%
Youngstown	75%

Reports that Ford, Chrysler and General Motors will shut down their assembly lines for a full two months



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this summer have brought emphatic denials from some quarters and expression of uncertainty from others.

According to an authority, Chrysler definitely has no such plans but will continue to gage its production closely to sales, hoping to maintain operations through all of June and part of July.

More emphatically, a Chevrolet executive declared late last week that Chevrolet production would continue all of June, July, August and part of September.

No comment was forthcoming from Ford, except the earlier announcement that there would be 19 full days of production this month, starting June 6. It is a rather safe prediction, however, that the Ford plant close-down will at least be under way by July 15, and may be complete by that time.

The rumor of a general automotive shutdown during the summer months has become widespread. A motor parts company executive is reported to have made such an assertion recently in Washington. Michigan's

Governor, Frank Murphy, left Lansing early this week for Washington to plead for more Federal aid for Michigan, predicting that the automobile industry is "moving into a complete shutdown."

The summer slack period in the automotive industry actually is the result of an unusual physical, mechanical problem. Even with minor model changes, two and one-half to three weeks generally are required to change over assembly lines, install new machinery, test and install new dies, retool, make hand-fit assemblies, etc., before the new models can be produced. Major changes in design, of course, require much longer time to rearrange the physical plant. One of the shortest shutdowns on record is attributed to Buick, which last year changed department by department without completely closing the factory. Its assembly line was down for only about 10 days or two weeks.

Expect Truck Sales to Farms

Auto companies are relying largely on greater farm prosperity to assist

them through the summer and fall months, pending a general upturn. Truck sales are expected to be spurred both by industrial rehabilitation programs and the necessity for moving the nation's largest domestic grain harvest.

Largely on this basis, William S. Knudsen, president of General Motors, is reported to be predicting a gradual business upturn in August or September, and the truck plants of the automobile industry are pointed toward supplying much new equipment to move the huge crops of wheat and rye. The wheat crop alone, according to an average of six authoritative estimates, will be 1,077,000,000 bushels, in contrast with the previous record crop in 1915, which totaled 1,009,000,000 bushels. Even at approximately 70c. a bushel this will represent a great deal of farm prosperity and the loosening of much latent farm buying power.

Out of every six farm automobiles, one is 10 years old or more, according to a survey made by the Federal Census in co-operation with the U. S. Department of Agriculture. Fifty-five per cent of farmers' cars are more than six years old. An even more striking picture of obsolescence is shown in farm figures for trucks and tractors, with one-fourth of the units more than 10 years old, and relatively few bearing manufacturing dates more recent than 1932.

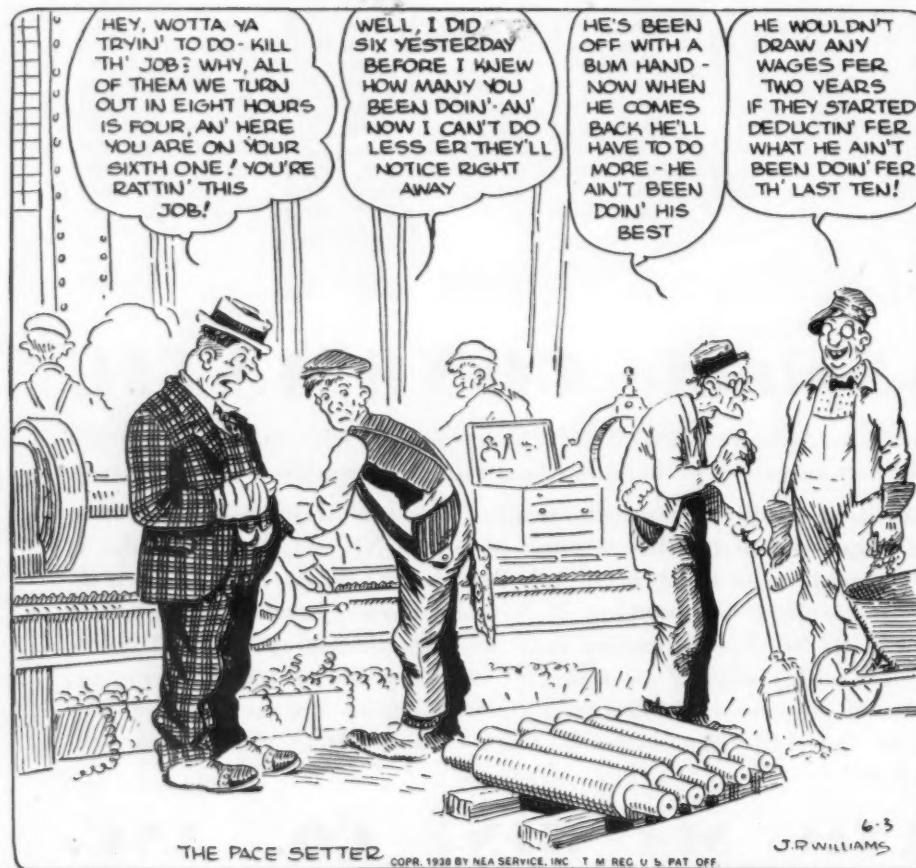
Auto Executives Indicted

Something like 50 of the most important automobile executives may be in a court in Indiana instead of at the National Automobile Show or their desks next fall, if the Government goes ahead with plans for trying them, along with their respective companies, on the indictments returned recently by a Federal grand jury in South Bend. At least, automotive spokesmen expressed the belief that the criminal charges would require the presence in court of all the individuals named in the indictments. However, it is generally believed that because the indictments promise to become a major political issue, particularly in the heated Senatorial campaign in Indiana, they may be dropped before the case has come to trial.

The history of the charges goes back through unsuccessful grand jury proceedings at Milwaukee last fall. In December, Federal Judge F. A. Geiger dismissed a grand jury in that city on the grounds that the Department of Justice showed "impro-

THE BULL OF THE WOODS

BY J. R. WILLIAMS



priety" in discussing a consent decree with the auto companies while the grand jury was considering the case.

After the middle of May, proceedings were resumed in South Bend, and it was announced that approximately 300 witnesses would be called to tell their story about alleged coercion by which the automobile companies were said to be promoting the volume of business of subsidiary finance companies. The surprise came a few days later when three indictments were returned, naming the Ford Motor Co., General Motors Corp., and Chrysler Corp., and 50 individuals.

All were charged with conspiring to promote monopoly by coercing dealers to finance car sales through the companies' own finance firms. The complainants are small financing companies, which the motor people assert are charging higher interest rates than the finance companies they are attacking.

Upturn by Fall Seen by Knudsen

A SHARP upturn in business by early fall is predicted by William S. Knudsen, General Motors Corp. president, who said this week:

"I sincerely believe that there will be a very definite improvement by early fall in all types of industry, business and professions. The farming and crop situation looks particularly bright. America has everything necessary for prosperity, and better distribution will soon help. Diesel engines have a great future in transportation and power but they are not flexible enough for passenger automobiles yet."

TRADE NOTES.

Sheffler-Gross Co. has appointed the Specialty Products Co., sales engineer, Boston, as exclusive distributor in the New England states for Daoflo suction and discharge strainers.

Driver-Harris Co., Harrison, N. J., announces a representative stock of high nickel content alloys in various shapes and sizes, particularly Nichrome and Nichrome V, is available for immediate delivery to the Pacific Coast trade. The warehouse is at 316 Eleventh Street, San Francisco, and the Pacific Coast representative is the Electrical Specialty Co., Ltd.

Hagerstown Bronze & Aluminum Co., Inc.,
Hagerstown, Md., has been dissolved and the
Kauffman Mfg. & Supply Co., Hagerstown,



IMPROVEMENTS in the lighting system on the final Cadillac-LaSalle inspection line have been made. The remodeled system uses a combination of mazda and mercury vapor lamps to bring inspection processes to a new peak in efficiency. A principal feature of the lighting is the evenness which permits inspectors to go over a car at any point with the guarantee that they will be working under the same degree of visibility. In addition to the new lighting system, Cadillac has painted floors white further to heighten visibility. In the picture, Cadillac's chief electrician, Earl Wickey, is checking the light distribution with an illuminometer.

will continue its general foundry and machine services.

The Mercoid Corp., heat control maker, 4201 Belmont Avenue, Chicago, has moved its New York office to the J. C. Penney Building, 330 West 34th Street.

Schneider Iron Works, Inc., Chicago, has changed its name to **Schneider Metal Mfg. Co., Inc.**, and has completed a larger plant at 1805-1815 South 55th Avenue, Chicago.

Acme Electric Welder Co., Huntington Park, Cal., manufacturer of spot welders, press type and projection welders and other welding equipment, has appointed these distributors: New York, Welding Engineering Sales Corp., 110 East 42nd Street; Chicago, Robert W. Hoffman Co., 13 South Clinton Street; Philadelphia, Joseph N. Moyer, 465 North Fifth Street. Northern California distribution is handled by the Victor Equipment Co., 844 Folsom Street, San Francisco, and southern California by Meyer Machinery Co., 1939 Santa Fe Avenue, Los Angeles.

Tungsten Carbide Tool Co. (division of Michigan Tool Co.), Midwest Tool & Mfg. Co., and the Morse Tool Co., all of Detroit, have signed dealer contracts with Vascoboy-Ramet Corp., North Chicago, Ill.

Bode-Finn Equipment Co., Inc., 1654 Central Avenue, Cincinnati, has been appointed distributor in southern Ohio by Bucyrus-Erie Co., South Milwaukee, Wis. Bucyrus-Erie shovels, draglines, clamshells, and lifting cranes, ranging from $\frac{3}{8}$ to 2-yd. sizes, will be sold by the Bode-Finn company.

British Criticise Scrap Buying in U. S.

LONDON (*By Mail*).—The British Iron and Steel Federation is now being blamed by its critics for making such enormous purchases of scrap in the United States last year. The president of the Board of Trade, however, is defending the action of the federation. He says that he cannot join in saying that the federation's action was foolish or mistaken.

"There was a danger of a real famine in steel holding up rearmament and other vital matters," he declares.

The critics' answer to that is that the federation got into a panic and that its action has proved the policy of mass buying for an industry to be a real danger. If the individual units of the industry had made their own arrangements, it is contended, some of them, but not all, would have made the same mistake as the federation.

THIS WEEK IN WASHINGTON

**... New Deal attacks alleged monopolies on many fronts
... FTC report holds eight companies control farm equipment output and prices . . . Congress may direct proposed anti-trust investigation . . . Department of justice denies ordering steel industry investigation . . . Lewis opposes President's plan for study of British labor laws.**

By L. W. MOFFETT
Resident Washington Editor
The Iron Age

• • •

WASHINGTON.—Big business, the basing point system and trade associations, viewed as fundamental factors in maintaining so-called rigid prices, and in conducting trade practices held to be objectionable, are outstanding subjects being considered by the anti-trust division of the Department of Justice as a preliminary to "a thorough study of the concentration of economic power in American industry and the effect of that concentration upon the decline of competition," asked for by President Roosevelt in a message to Congress on April 29.

The price structures in steel, rubber, cement and other large industries are under close scrutiny by the economic unit of the Department of Justice, the data, charts, etc., being assembled as a basis for the proposed study for which the President has asked a \$500,000 appropriation. George P. Comer, head of the unit, told *THE IRON AGE* that no particular industry has been singled out, but that material being collected covers a number of

industries. It was also denied at the Department of Justice that it had ordered an investigation of the steel industry. A published report had said the inquiry would be undertaken in July.

Steel High on List

Nevertheless, the Department of Justice only awaits a Congressional appropriation before instituting the so-called anti-monopoly investigation and steel is in the forefront of the industries to receive attention in the contemplated move to decentralize "big business," to break down the basing point system and to supervise activities of trade associations. No attempt is made to indicate what may be done, in the absence of an investigation, in any one or all of these fields. It is, however, a fixed opinion of the Administration that each is responsible for so-called rigid prices and it is insisted that flexibility in prices is necessary. Though difficult to reconcile with the insistence that prices in steel and other industries are "rigid," it is also said that the Administration has in mind the setting up of little NRAs for various industries, which, based on the Blue Eagle precedent, would essentially fly in the face of anti-trust laws and peg prices, practices which do not prevail under a system of free competition.

The attack on "big business" appears to be based on the conception that its policies, such as those on prices, are used by smaller units as a yardstick

for setting price levels. It is conceded that there are examples of big industries whose price policy is not frowned upon, yet the point is made that such a policy is used by the smaller units to establish their prices. The conclusion is reached from this premise that decentralization of big business is essential.

Disagree on Basing Point

On the basing point, there is evidently no clear idea as to what alternative system should be adopted to replace it. Some officials in the Government easily say that the answer is an f.o.b. mill system of quotation. But the Government economists are not in complete agreement. Some realize that a quick uprooting of the established basing point system would be disastrous to producers, consumers and labor alike. Moreover, it is admitted that the system, merely because it produces identical quotations, has favorable aspects and is competitive. This, though, is a minority view. The President himself in his so-called anti-monopoly message, went so far as to say that "proof by the Government of identical bids, uniform price increases . . . or other specified price rigidities might be accepted as *prima facie* evidence of unlawful actions."

Government supervision of trade associations is held to be necessary on the ground that they are responsible for agreement on prices, and trade practices held to be "monopolistic" in character. The President urged "supervision and effective publicity of the activities of trade associations, and a clarification and delineation of their legitimate spheres of activity which will enable them to combat unfair methods of competition but which will guard against their interference with legitimate competitive practices."

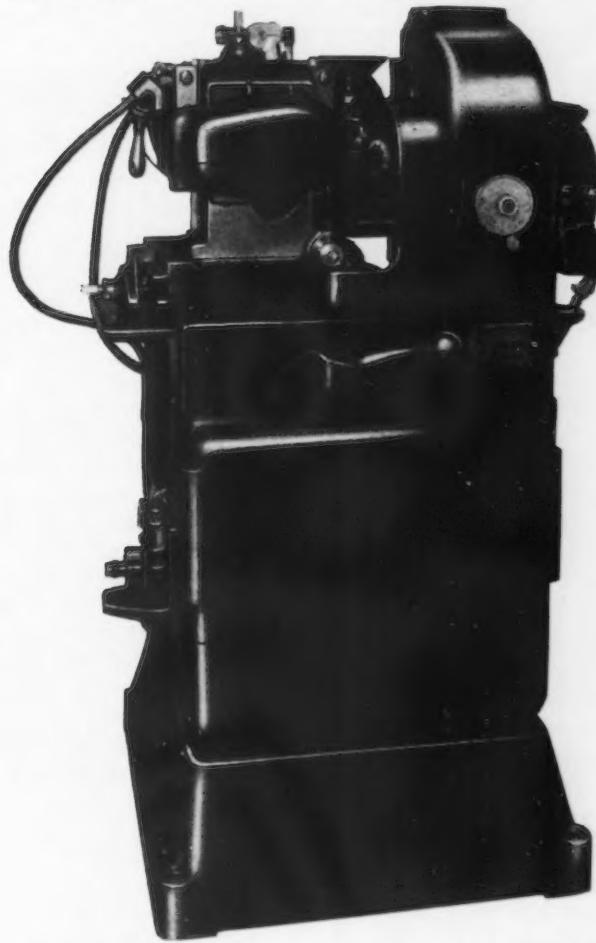
Industrial Bureau Proposed

The President has recommended that a Bureau of Industrial Economics be established to supplement and su-

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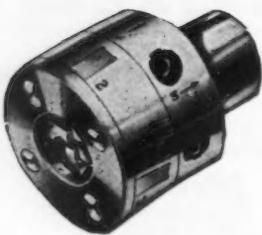


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pervise the collection of industrial statistics by trade associations, a proposal that is said to have originated with Donald R. Richberg. The bureau, so the President said, should perform for business men functions similar to those performed for the farmers by the Bureau of Agricultural Economics. The idea of establishing such a bureau has been received favorably by some business groups, largely because it has been projected by Mr. Richberg who, on the whole, has reflected a sympathetic attitude toward both business and labor. But since left wingers, with an eye on the present Congressional campaign and the forthcoming Presidential campaign, are regaining power in the Administration, business support for the bureau is clearly diminishing. The fear grows that it would be only a part and parcel of the ever-growing, lumbering and profligate Government bureaucracy.

On a larger scale, the study the President has asked for is viewed, not only as a business-harassing undertaking, but also as a piece in the Administration's underlying motif of building up concentrated Federal control over the economic, financial, and industrial life of the nation, the further intensifying of the most powerful of all monopolies—Government monopoly. As pointed out by the President the study would not be confined to the "traditional anti-trust field." He said also that the effects of tax, patent and other Government policies "cannot be ignored."

Yet the studies demanded have been made, particularly in the anti-trust field. Criticism is made that material in abundance already is at hand and that the proposed study not only will be a duplication of effort but further waste of money. The Federal Trade Commission itself has just completed an exhaustive price study at the President's request. It covered the basic industries, including steel, the basing point system and related matters such as again are up for sweeping investigation. For some reason or other the FTC study has not been made public by the White House. The assumption is that material in the FTC report will be used in connection with the present Department of Justice studies, and it is likely there is considerable duplication in the two undertakings.

Write to Please President

The FTC material no doubt would fit in well with the Department of Justice's work inasmuch as the FTC invariably rages about monopolistic

control, big business, the basing point system and other such issues which are under Administration attack. The FTC never fails to make the sort of report that the White House desires. In this connection it is significant that the President has asked that the FTC, together with the Securities and Exchange Commission and "such other agencies of the Government as have special experience in various phases of the inquiry," would join the Department of Justice in the study. The Senate Judiciary Committee has voted tentatively to take away from the President the authority to allocate the requested \$500,000 study fund, transferring the authority to the committee itself.

Political significance also is seen in the proposed study. The opinion prevails that the Administration, facing a deep depression, always a serious threat to a political party in power, desires again to shift the blame of the business collapse from its shoulders to big business. Repeatedly Administration spokesmen are putting forth this propaganda and in his anti-trust message the President himself made "big business" the whipping boy. Said the President:

"One of the primary causes of our present difficulties lies in the disappearance of price competition in many industrial fields, particularly in basic manufacture where concentrated economic power is most evident—and where rigid prices and fluctuating payrolls are general."

No "Breathing Spell" Ahead

He took particular pains to exculpate Government policies on tax, labor and social legislation from responsibility for the price situation which is being attacked. And it is a foregone conclusion that reports on any studies made will not find that taxes or wages justify the prices under attack, despite the obvious factors that they are principal elements in costs.

To the complaint that there should be a breathing spell for business now of all times the New Deal answer is seen in a statement by Assistant Attorney General Arnold before the Trade and Commerce Bar Association of New York on April 28.

"It is my conviction," said Mr. Arnold, "that from a long range point of view the vigorous enforcement of anti-trust laws is never more important than during periods of economic recession. Such periods give the larger and stronger firms new incentives and easier opportunities for extending their control over a narrow market."

Congress May Guide Anti-Trust Inquiry

WASHINGTON. — Congress, rather than the executive branch, would have control of the proposed anti-trust investigation if the resolution of Senator O'Mahoney, Democrat, of Wyoming, is passed as tentatively revised by the Senate Committee on Judiciary. The resolution authorizes a \$500,000 joint executive legislative study of so-called monopolistic practices which the President asked for in a recent message to Congress. The committee approved an amendment removing authority given the President to allocate the funds and transferring such authority to the committee itself. In his message the President recommended that the study be made by the Federal Trade Commission, the Department of Justice, the Securities and Exchange Commission and other Government agencies which he might select. The implication was that the President desired that the investigation be made exclusively by the Executive branch.

The Senate Judiciary Committee also eliminated from the O'Mahoney resolution a provision which would authorize representatives of the executive departments to constitute themselves as a committee to subpoena witnesses, take testimony under oath and fix dates and places for hearings. By this action, this power would be given to the full committee.

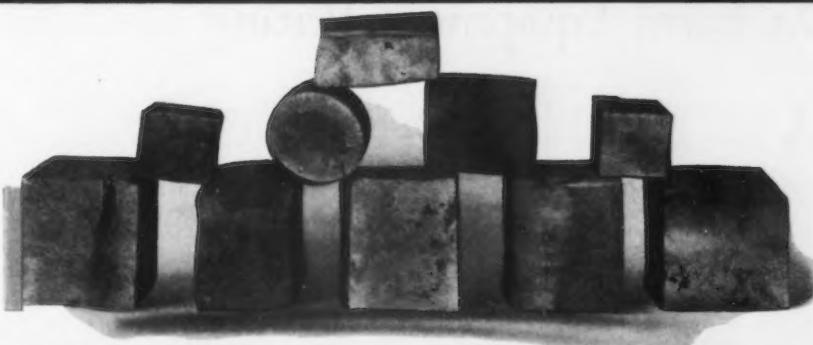
The committee also voted to substitute the Department of Commerce for the Labor and Treasury departments as executive agencies on the investigating committee.

In its revised form the O'Mahoney resolution would set up a joint investigating committee made up of three Senators, three Representatives and one member each from the departments of Justice and Commerce, the Federal Trade Commission and the Securities and Exchange Commission.

Members of the committee, while unwilling to be quoted, made no secret of the fact that the vote to take from the President authority to allocate funds for the investigation and to retain the authority for the Senate committee, was due to fear that otherwise the money would be used for political purposes in the two national campaigns that will eventuate before the investigation is concluded.

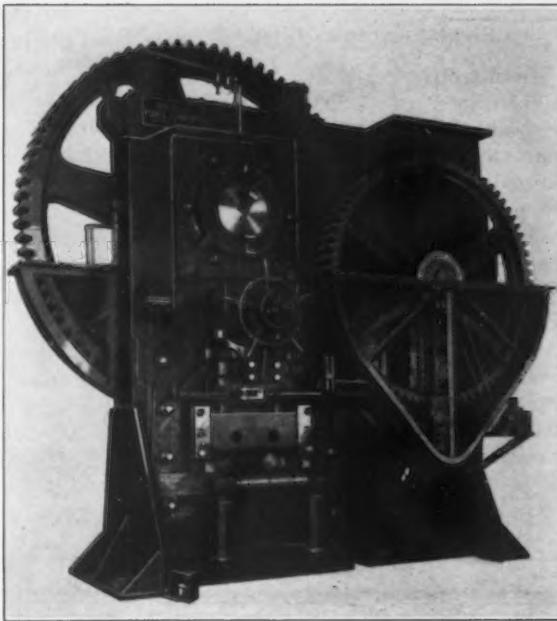
One of the outstanding matters to be inquired into relates to the alleged rigidity of prices in basic industries, such as steel, cement, lumber, etc.

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Frames are built of "Armor-Plate" steel and are electrically welded to provide rigid construction—guaranteed forever against breakage.

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Congress Gets FTC's Report On Farm Equipment Pricing

WASHINGTON.—The Federal Trade Commission turned over to Congress on Monday a 1000-page report on its two-year investigation of the agricultural implement and machinery industry and complained that the bulk of production is concentrated in the hands of a relatively small number of manufacturers. It deferred its recommendations for remedial action to a later date at which time the second part of the study dealing with prices, profits, costs and investments will be completed.

Eight Companies Cited

The investigation, which cost in the neighborhood of \$150,000, was authorized by Congress on June 24, 1936, after the anti-monopoly bloc had charged repeatedly that farm machinery prices were maintained at high levels during the depression when farm income dropped from around \$5,000,000,000 in 1929 to \$1,500,000,000 in 1932. The FTC completed a similar survey in 1920 on the "Causes of High Prices of Farm Implements" and charged that manufacturers were attempting to "cooperatively control or restrict competition and enhance prices."

These older, cruder and "more obvi-

ously illegal agreements" have been substituted, the commission said in its report, by present practices of following price leaders in the industry, exchanging information on prices and specifications, and greater standardization of design and construction. The commission cited International Harvester Co., Chicago, and the Deere & Co., Moline, Ill., as the industry's "price leaders" but said that concentration of control is largely in the hands of eight large, long-line companies and greatest in the manufacture of harvesting machines, tractors and the latest type of tractor-operated machines.

Other companies included in the group were: J. I. Case Co., Racine, Wis.; Allis-Chalmers Mfg. Co., Milwaukee; Oliver Farm Equipment Co., Chicago; Minneapolis-Moline Power Implement Co., Minneapolis; Massey-Harris Co., Inc., Racine, Wis., and B. F. Avery & Sons Co., Louisville, Ky.

While conceding that International Harvester Co.'s production, which it described as "far greater" than that of any other company, is decreasing, the commission reported that from four to six of the eight companies "dominate both the manufacture and

sale" of the products. The FTC said it found nothing to indicate close relationship among the larger companies through common ownership of stock or interlocking directors or officers.

Claims Few Lead Others

"Where a few companies control the bulk of production," the report said in reference to manufacturers' pricing practices, "their acts and policies determine the conditions under which all manufacturers and dealers must operate. Similarity of policies respecting prices, terms and competitive practices, to some extent, tends to result whether the policies are determined by the companies individually and competitively, or by understandings or agreements."

Touching on other subjects which the commission felt involved possible restraint of trade or tendencies toward further concentration of control, the report directed attention to alleged coercive measures to enforce exclusive dealing among distributors which it said has "extensive adverse effects" upon small manufacturers, retailers and farmers. Restricting competition from smaller manufacturers by full-line forcing methods tends to strengthen the dominant position of the few larger manufacturers, the report said.

Institute Report Criticized

The commission was bitterly critical of a 1933 report entitled "An Inquiry into Changes in the Quality Values of Farm Machines between 1910-1914 and 1932" and published as a cooperative enterprise between the Farm Equipment Institute and the American Society of Agricultural Engineers. The report charged that the institute's publicity or research division and the society had concealed the true origin and authorship of the study, giving it "a standing of independent authorship and scientific value which it did not deserve."

The FTC also emphasized that farm implement production decreased from \$607,000,000 in 1929 to \$95,000,000 in 1932 as a result of a drastic drop in farm income in illustrating the "primary importance" of farm income in relation to the industry. It also reminded the Congress that 1936 and 1937 were the most prosperous years for farm machinery manufacturers since the World War.

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L'ALCHIMISTA
by
GIOVANNI STRADANO
(Born 1536—Died 1605)
Original Painting in Florence, Italy



*OhioFerro-Alloys Corporation
Canton, Ohio*

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Iron Ore Output of 2.25 Tons Per Second Near Peak in '37

WASHINGTON.—Produced at a rate of more than 2½ tons per second for the entire year, the 1937 output of iron ore in the United States amounted to 72,093,548 gross tons, an increase of 48 per cent over 1936, the Bureau of Mines reports.

Production in 1937 was the fourth highest on record and was only 4 per cent less than the all-time high record established in 1917. The ore shipped from mines in 1937 amounted to 72,347,785 gross tons valued at \$207,828,213, an increase of 41 per cent in quantity and 58 per cent in total value

compared with 1936. Shipments in 1937 were the fifth largest on record and were only 7 per cent smaller than the record year of 1916.

A greater tonnage of new aluminum was produced in the United States during 1937 than in any other year. The 1937 record output of virgin aluminum amounted to 292,681,000 lb. valued at \$55,609,000, compared with 224,929,000 lb. valued at \$41,612,000 in 1936. Production in 1937 was 30 per cent greater than in 1936 and exceeded the previous peak reached in 1930 by 28 per cent.

The unprecedented domestic demand for manganese ore in 1937 was met chiefly by record imports. While shipments of ore containing 35 per cent or more manganese from domestic mines in 1937 increased 25 per cent over 1936, they amounted to only 40,241 gross tons compared with imports of 911,922 tons. Domestic production of concentrated tungsten ores (reduced to an equivalent of 60 per cent WO_3) amounted to 3500 net tons valued at \$4,094,000 in 1937 as compared with 2612 tons valued at \$2,323,818 in 1936. Imports of tungsten into the United States showed a large increase.

Paralleling the increase in open-hearth steel-making activity, the apparent consumption of dead-burned magnesite for refractory uses increased 5 per cent in 1937 to a new all-time record.

So great was the demand for fluor-spar that domestic shipments in 1937 were the largest since 1920 and imports were the greatest since 1930. Domestic production was about 9 per cent more than in 1936.

Copper Up Third

The smelter production of copper from domestic ores in 1937, as determined by the Bureau of Mines from preliminary reports, was 1,687,000,000 lb., an increase of 38 per cent over the output of 1,222,819,396 lb. in 1936.

The production of new refined copper from domestic sources was about 1,614,000,000 lb., compared with 1,290,924,195 lb. in 1936. The output of new refined copper from domestic and foreign sources in 1937 amounted to about 2,113,000,000 lb., compared with 1,644,977,410 lb. in 1936, an increase of 468,000,000 lb. or 28 per cent. The production of secondary copper by primary refineries increased from 265,829,723 lb. in 1936 to about 320,000,000 lb. in 1937. Thus the total primary and secondary output of copper by the refineries in 1937 was 27 per cent higher than in the preceding year—a production of about 2,433,000,000 lb. being reported for 1937 as compared with 1,910,807,133 lb. in 1936.

Production of recoverable lead from domestic mines in 1937 increased 23 per cent from 1936, although 1936 production was substantially ahead of the 1935 output.

The output of recoverable zinc from domestic mines in 1937 increased 7 per cent over 1936, in which year zinc production had recovered to 80 per cent of the pre-depression average.

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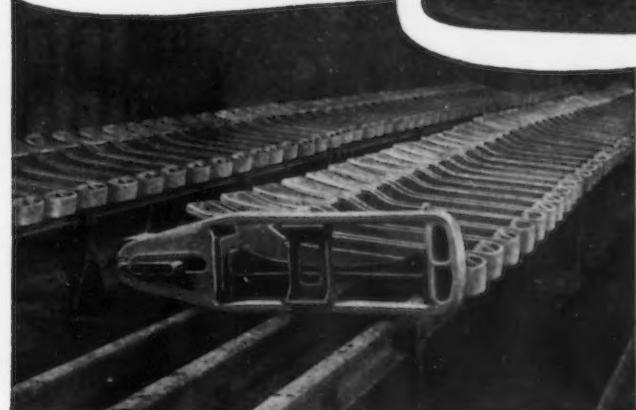
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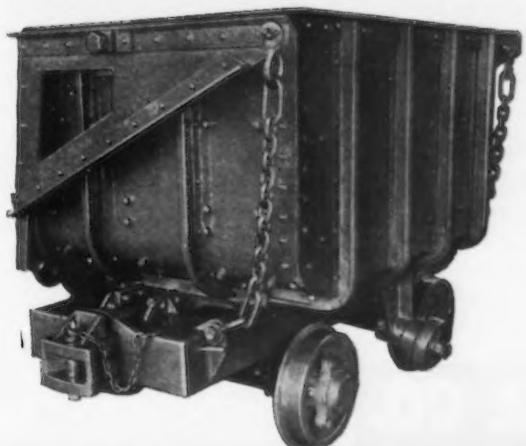
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..ON MANHATTAN STREETS — To save trucking tons of deadweight through congested traffic, the City of New York specified its new fleet of refuse trucks with lightweight, high-strength bodies of "Yoloy". These self-loading, self-dumping bodies were built by Gar Wood Industries on GMC chassis. Yoloy is a Nickel-copper steel which resists wear and corrosion. It is produced by the Youngstown Sheet & Tube Co.

..OVER MOUNTAIN GRADES — The progressive Union Pacific Railroad has learned that freight car castings can be lightened 20-25% by utilizing Nickel cast steels. These tough Nickel alloy steel bolsters were produced by the Buckeye Steel Castings Company for the Union Pacific's modern new freight cars.

DEEP IN MINES — 3,000 feet down in a Copper Cliff mine, rust and corrosion continuously attack metals. Hurried loading and dumping of ore-bearing rock causes severe abrasion. To cut handling costs, light-weight Granby-type mine cars of Nickel alloy steels were ordered from the Canadian Car & Foundry Company. This modern Nickel alloy steel equipment so markedly reduced operating and repair costs that 123 additional cars will soon be in use.



THE INTERNATIONAL NICKEL COMPANY, INC., NEW YORK, N.Y.

CIO Opposes Roosevelt's Plan To Study British Labor Laws

WASHINGTON. — President Roosevelt's move to send a commission to Great Britain to study the British Trade Disputes and Trade Union Act has aroused speculation as to whether the Administration, faced with persistent complaints of a defective labor relations law, is

moving indirectly to bring about revision of the law.

Mr. Roosevelt denied that the step concerned Wagner Act revision but most observers had difficulty in refraining from connecting the two, and CIO Chieftain John L. Lewis, apparently concerned over the reports, said

in a letter to Secretary of Labor Frances Perkins that the CIO could not sanction such an enterprise and that its representatives would refuse to serve on the commission.

There were discussions also as to whether the Administration might be moving to force an end to labor's civil war and put labor's house in order or accept a revised labor relations law patterned after the British system—a change which would be far less satisfactory to organized labor. These rumors lacked confirmation, however, since President Roosevelt insisted that the study was being launched to correct what he called a great deal of misinformation concerning the British law.

The President himself has frequently referred to the British Trade Disputes Act, usually when stressing a favorite argument that the subject of labor relations is an evolutionary one and that any revision of the Wagner Act will inevitably come over a long period of time just as has been done in England from time to time. He reiterated this statement last Friday when asked if he considered the Wagner Act satisfactory. He merely pointed out that labor relations in Great Britain have reached a stage of development far ahead of those in this country.

Mr. Roosevelt also was uncommunicative on other details of the contemplated study. Although he said the whole idea was his own, he did not know who would be named to the commission, nor did he know to whom it would report when its work was completed. He did say, however, that it would be composed of representatives of employers, employees and the Government.

Some reports were that Gerard Swope, president of General Electric Co., and Lloyd K. Garrison, Wisconsin University law school dean and former chairman of the Labor Board, would be named to the commission. The President would not deny or confirm these reports, suggesting only that the list of proposed members had not been completed.

Dumore Co., Racine, 25 Years Old In 1938

THE Dumore Co., Racine, Wis., manufacturer of fractional horsepower universal motors and portable electric tools for precision grinding, this year is celebrating the silver anniversary of its establishment by L. H. Hamilton, president of the company, and the late Chester Beach.

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With all the svelte lines of a Paris creation, this stamping is destined to please the eye of a lady. More important to industry perhaps, it favored the purse of our customer.

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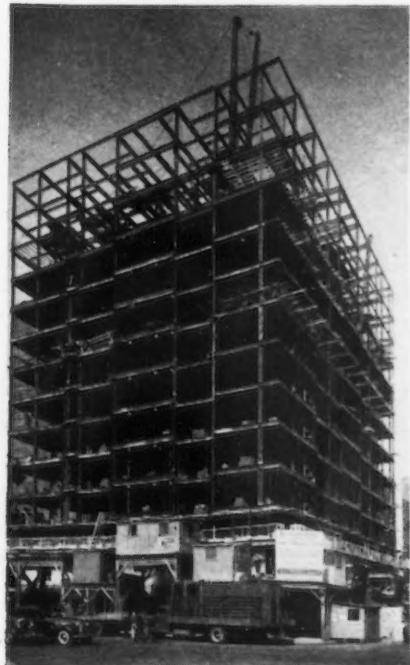
PACIFIC COAST REPRESENTATIVE, F. Somers Peterson Co., 57 California St., San Francisco, Cal.

Navy, Army Oppose Forced Loans To U. S. in Wartime

WASHINGTON.—Three United States departments this week opposed a bill forcing individuals to lend money to the Government in wartime at 1 per cent. While the Senate Military Affairs Committee approved the measure, sponsored by Representative Josh Lee, Democrat of Oklahoma, the Navy described the bill as "forcing loans," the War Department foresaw it as "causing serious delay," and the Treasury predicted administration difficulties would be enormous.

First Welded Steel Building in New York

THE 14-story building shown under construction in the accompanying photograph is the first building of welded construction erected in New York under the city's revised building code. The revised code, which went into effect early this year, permits the use of welding in the construction of buildings for the first time in the city's history. The building shown in the photograph is located at Eighth Avenue and 20th Street, New York, and was erected by the Lehigh Structural Steel Co., New York. Six gasoline-driven generators, four Wilson 300-amp., one Lincoln 300-amp., and one Electric Arc Cutting & Welding Co. 200-amp., were used to supply current for the welding operations. The generators were



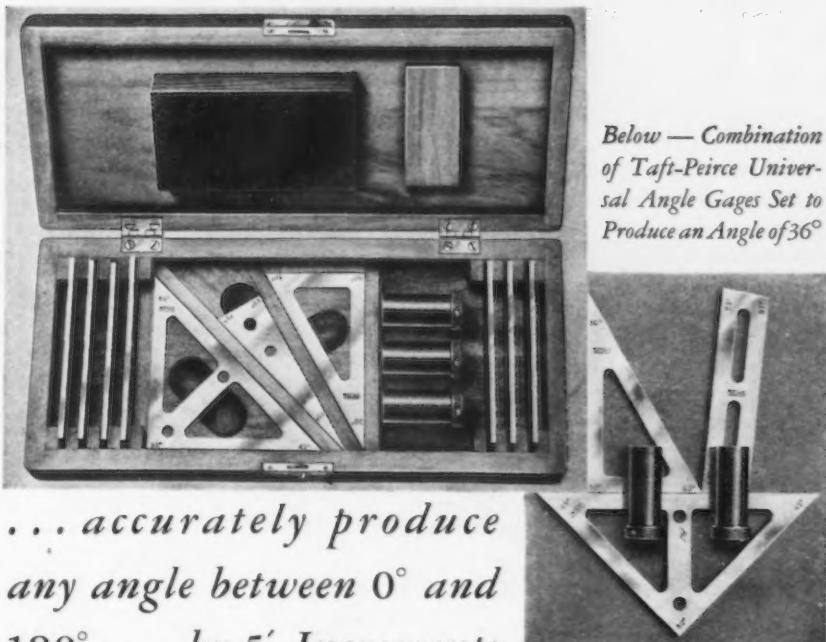
located on the ground floor and leads were run up to the various floors as the work progressed.

Scrap Institute Chapter Formed at Minneapolis

A NEW chapter of the Institute of Scrap Iron and Steel, with headquarters at Minneapolis, has been formed by scrap dealers from Minnesota, Iowa, North Dakota and South

Dakota. Sol H. Rosen, of Union Scrap Iron & Metal Co., Minneapolis, was elected president; G. W. Landy, Peoples Iron & Metal Co., Minneapolis, vice-president; H. Cohen, General Iron & Metal Co., Minneapolis, secretary. The executive committee includes the three officers and Meyer Karon, Northwestern Iron & Metal Co., Duluth, Minn.; H. Schnitzer, of Schaitzer Iron & Metal Co., St. Paul, Min.; Arthur Harris, of Harris Machinery Co., Minneapolis.

New TAFT-PEIRCE UNIVERSAL ANGLE GAGES



... accurately produce any angle between 0° and 180°... by 5' Increments

Applied directly to the work—without any obstruction—this new set of patented universal angle gages marks a definite improvement over protractors or other means of measuring and laying out angles.

The complete set shown, comprises 10 independent angle gages . . . 7 of which are parallel blades with a pair of supplementary angles on each end . . . and 3 of which are triangles. The universal angle members are fixed in combination for convenient handling and

use by an ingenious clamping device, 3 of which are provided in each set, as shown. All gages are made of tool steel, hardened and precision-ground so that variation from exact angle of any combination will not exceed 1'.

A set of Taft-Pearce Universal Angle Gages will be highly useful in tool-rooms, die shops, manufacturing and inspection departments, for laying out and checking all angles. Each set packed in hard wood case, complete with instructions. **WRITE FOR PRICES.**

THE TAFT-PEIRCE MFG. CO.

Woonsocket  Rhode Island

THE NEWS IN BRIEF.

... Detroit City Council considering an Industrial Peace Board patterned after Toledo Plan—Summer shutdowns of automobile plants discredited.—Page 46.

... New Deal study of price structures to be begun by Department of Justice; basing point system and trade association considered vital factors in "rigid" prices.—Page 50.

... Sustaining factors in machine tool demand are the army and navy and aircraft builders.—Page 102.

A sharp upturn in business by early fall is predicted by William S. Knudsen, president, General Motors Corp.—Page 49.

Scrap buying in United States criticized by the British Iron and Steel Federation.—Page 49.

Output of iron ore in the United States of 72,093,548 gross tons in 1937 near peak production.—Page 56.

Opposition to bill forcing individuals to lend money to the Government in wartime at one per cent.—Page 59.

First welded 14-story building under revised code being constructed in New York City.—Page 59.

New chapter of the Institute of Scrap Iron and Steel formed at Minneapolis.—Page 59.

Ingots production six per cent lower in May; five months' total 9,180,867 tons.—Page 62.

Steel payrolls totaled \$47,809,000 in April, seven per cent below March total of \$51,386,000.—Page 63.

Case Co. resume operations at Rockford, Ill., plant after forced closing for over month by strike.—Page 63.

SWOC to conduct lectures on union procedure and activi-

ties at camp-school near Ligonier, Pa.—Page 63.

Shasta Dam low bid \$35,939,450, to Pacific Coast Constructors, Inc.; large quantities of steel required.—Page 64.

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CONVENTIONS

June 12 to 17—Society of Automotive Engineers, White Sulphur Springs, W. Va.
June 13 to 15—American Electro-Platers' Association, Milwaukee.
June 20 to 24—American Society Mechanical Engineers, St. Louis.
June 27 to July 1—American Society for Testing Materials, Atlantic City, N. J.
Sept. 26 to 30—Association of Iron and Steel Engineers, Cleveland.
Oct. 10 to 14—American Institute of Steel Construction, French Lick Springs, Ind.
Oct. 12 to 15—The Electrochemical Society, Rochester, N. Y.
Oct. 17 to 21—National Metals Congress, Detroit.

Great Lakes' new blooming mill in operation capable of handling 24,000-lb. ingots.—Page 71.

Dr. Sauveur to deliver the Edgar Marburg lecture at the 41st annual meeting of the American Society for Testing Materials.—Page 72.

Farrell-Birmingham honors 130 employees who have been with the company a quarter century.—Page 72.

Packer Machine Co. purchases new factory at Meriden, Conn.—Page 72.

Coal operators organize in Western Pennsylvania under the Guffey Coal Act, to be known as the Western Pennsylvania Coal Corp.—Page 76.

Algoma Steel Corp. announces a \$2,000,000 building program.—Page 76.

"Porcelain enamel on steel" discussed by Porcelain Enamel Institute.—Page 76.

All obstacles removed for renewal of European steel cartel.—Page 77.

Engineers, not reformers, can make jobs, Tom M. Girdler says in warning to Case School alumni against forces seeking to "strike a dagger into the heart of the profit system."—Page 78.

Wickwire-Spencer Steel Co. announces it will build a new wire mill at Buffalo to cost \$500,000.—Page 78.

Almost 12 per cent drop in May pig iron output, may total 1,255,024 tons.—Page 81.

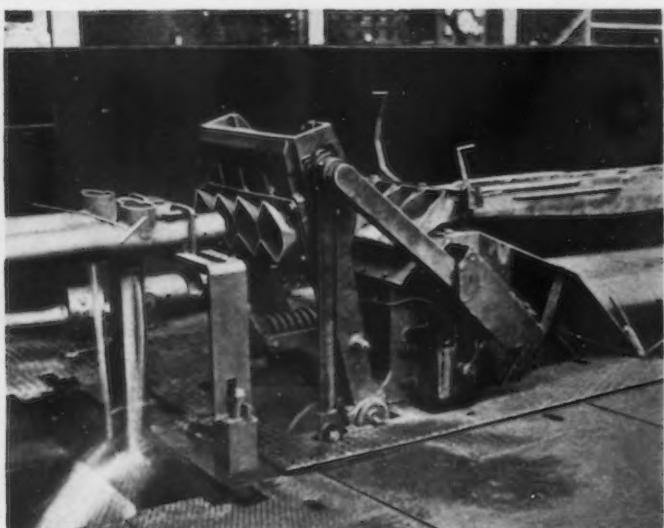
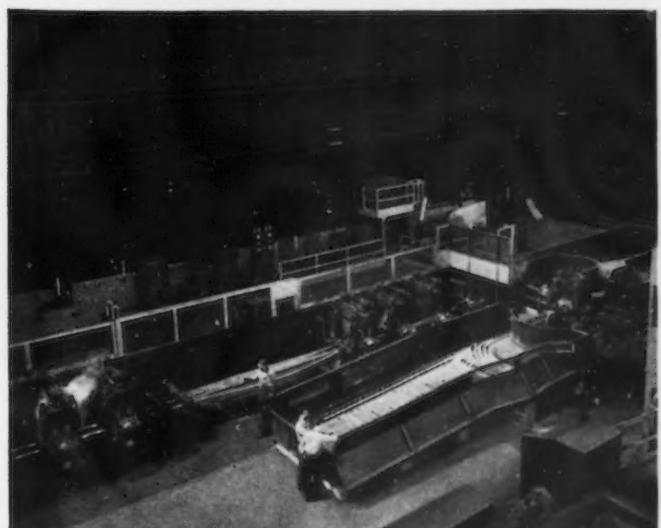
Newport News (Va.) Shipbuilding & Dry Dock Co. gets \$8,320,000 cargo boats contract.—Page 81.

April zinc exports below last year.—Page 81.



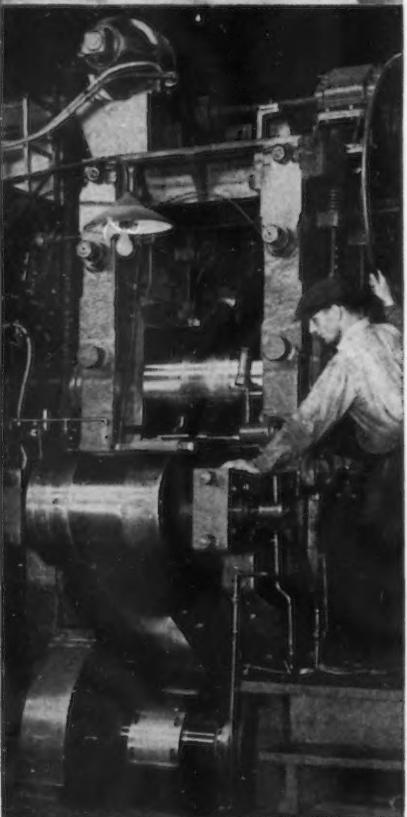
Morgan open top cast steel roll housing in four strand roughing mill. Note Mergoil Bearings and accessibility of top roll end adjustment. Below is shown intermediate roughing and looping stands; also four strand flying shear.

R42



Stainless Steel Strip Specialists

Open Hearth
Chromium-Nickel and
Straight-Chromium
Steels



Barium
STAINLESS STEEL CORP.
CANTON, OHIO.

Ingot Production 6% Lower in May; Five Months' Total 9,180,867 Tons

PRODUCTION of open-hearth and bessemer steel ingots in May was 6 per cent below that of April, it is reported by the American Iron and Steel Institute. May output was 1,806,805 gross tons against 1,925,166 tons in April. The weekly average was 407,857 tons last month and 448,757 tons in April.

During the peak month of last year—April—the weekly average of 1,182,020 tons was greater than the production for the entire month of May this year. This year's May output was 65 per cent below that of the same month in 1934.

In May the industry was engaged at 30.39 per cent of capacity. The very narrow fluctuations in production during the first five months of this year are illustrated by an average operation of 31.71 per cent of capacity, the highest monthly figure having been 33.85 per cent in March and the lowest 29.15 per cent in January.

Total production in the first five months was 9,180,867 tons, indicating that the first half's total will be less

than 11,000,000 tons. Unless there is greater improvement during the last half of the year than can at present be visualized, the year's total may not reach 25,000,000 tons, which would be less than the 1934 figure.

New Zealand Plans Own Steel Industry

THE New Zealand Parliament recently enacted a law providing for establishment of an iron and steel industry to be controlled and operated solely by the Dominion Government.

Under the new law, New Zealand intends to manufacture steel sheets, sections, bars, wire products, rails, and small billets, and foundry pig iron. It has been estimated that the new industry will require annually some 200,000 gross tons of iron ore, 70,000 tons of limestone, 3000 tons of manganese ore, 160,000 tons of coal, and 11,000 tons of phosphate rock. Most of the foregoing are obtainable from local deposits.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS

(Reported by Companies Which in 1936 Made 98.29 Per Cent of the Open-Hearth and 100 Per Cent of the Bessemer Ingot Production)

1937	Reported Production (Gross Tons)		Calculated Production All Companies		Number of Weeks	Per Cent of Capacity
	Open-Hearth	Bessemer	Monthly	Weekly		
January	4,349,024	292,209	4,718,436	1,065,110	4.43	81.32
February	4,011,852	331,629	4,414,699	1,103,675	4.00	84.27
March	4,730,943	402,400	5,218,326	1,177,952	4.43	89.94
1st Quarter	13,091,819	1,027,238	14,351,461	1,115,977	12.86	85.20
April	4,600,418	388,783	5,070,867	1,182,020	4.29	90.25
May	4,686,052	382,671	5,151,909	1,162,959	4.43	88.79
June	3,832,082	284,615	4,184,723	975,460	4.29	74.48
2d Quarter	13,118,552	1,056,069	14,407,499	1,107,417	13.01	84.55
1st 6 Months	26,210,371	2,083,307	28,758,960	1,111,672	25.87	84.88
July	4,147,227	335,456	4,556,304	1,030,838	4.42	78.48
August	4,425,998	373,259	4,877,826	1,101,089	4.43	83.83
September	3,950,899	268,472	4,289,507	1,002,221	4.28	76.30
3d Quarter	12,524,124	977,187	13,723,637	1,045,212	13.13	79.58
1st 9 Months	38,734,495	3,060,494	42,482,597	1,089,297	39.00	83.09
October	3,148,321	188,715	3,392,924	765,897	4.43	58.31
November	2,004,890	113,885	2,154,365	502,183	4.29	38.23
December	1,362,010	86,833	1,473,021	333,263	4.42	25.37
4th Quarter	6,515,221	389,433	7,020,310	534,270	13.14	40.68
Total	45,249,716	3,449,927	49,502,907	949,423	52.14	72.38
1938						
January	1,604,363	99,991	1,732,764	391,143	4.43	29.15
February	1,550,772	125,493	1,703,726	425,932	4.00	31.74
March	1,822,398	157,737	2,012,406	454,268	4.43	33.85
1st Quarter	4,977,533	383,221	5,448,896	423,709	12.86	31.58
April	1,762,315	131,644	1,925,166	448,757	4.29	33.44
May	1,647,049	130,590	1,806,805	407,857	4.43	30.39

NOTE: 1937 figures and some in first quarter of 1938 have been revised.

Week in Steel Averages 25.6 hr.

APRIL steel payrolls totaled \$47,809,000, or 7 per cent below the March total of \$51,386,000, according to the American Iron and Steel Institute. A total of 445,000 employees were on the payrolls of the industry during April, as compared with 455,000 in March. Between April, 1937, and April, 1938, steel production dropped 62 per cent, while the number employed in the industry dropped only 24 per cent, and total payrolls only 49 per cent. In April of last year the industry employed 589,000 men, and paid out \$94,322,000 in payrolls.

Wage-earning employees of the industry earned an average of 82.6c. per hour in April, as against 81.8c. in March. In April, 1937, when the high rate of operations required a substantial amount of overtime work, for which time-and-a-half is paid, wage-earning employees earned an average of 85.0c. per hr.

Number of hours worked per week by wage earners in April averaged 25.6, which compares with an average of 26.7 hr. per week in March and with 41.3 hr. per week in April of last year.

Operations Resumed At Plant Closed by Strike

CHICAGO.—Operations were resumed last week at the Rockford, Ill., plant of the J. I. Case Co. after a strike had closed the unit for more than a month. Most of the 1700 men normally employed were reported to have returned to their posts. United Automobile Workers of America officials instructed all men to return to work after John T. Conner, labor department conciliator, arranged for the management and a committee of employees to hold negotiation conferences.

Camp-School Is Planned by SWOC

TO provide a cheap vacation and at the same time conduct lectures on union procedure and activities, the Steel Workers' Organizing Committee plans to open a summer camp near Ligonier, Pa., for two weeks beginning July 10. All officials and members may attend for \$5 a week. Outside speakers such as J. Warren Madden of the National Labor Relations Board, have been invited to lecture.



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Roller chain drives do
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structive to costly shaft
bearings.

BALDWIN-DUCKWORTH CHAIN CORP.
SPRINGFIELD and WORCESTER, MASS.

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B-D MAN*

DUCKWORTH

Shasta Dam Low Bid \$35,939,450; Large Quantities of Steel Required

SAN FRANCISCO.—Pacific Constructors, Inc., Los Angeles, is low bidder to the Bureau of Reclamation, Sacramento, for the construction of Shasta Dam, key unit of the Central Valley, Cal., project.

Its bid, \$35,939,450, was only slight-

ly lower than that of the only other bidder, Shasta Construction Co. of San Francisco, which bid \$36,202,357.

The dam, to be erected across the Sacramento River Canyon about 12 miles north of Redding, Cal., will be a gravity-section concrete structure,

about 560 ft. high and 3500 ft. long, built on a slightly curved axis. It will have an overflow spillway in the center and a 350,000-kw. power plant flanking the base. Second to Boulder in height and second to Grand Coulee in mass, Shasta Dam will be first in at least one respect—as the highest overflow type of dam in the world. Water falling over the 375-ft. spillway in the center of the dam will drop 480 ft., or about three times the height of Niagara Falls.

Materials for the dam, which will be furnished by the Bureau of Reclamation, include 13,000 tons of reinforcing steel in the dam and powerhouse, 6500 tons of penstock and outlet pipes, 4000 tons of small tubing for cooling and grounding nearly 6500 tons of steel gates and control mechanisms, and over 1500 tons of trash-rack steel. In addition to these quantities, approximately 40,000 tons of steel will be required for railroad relocation, and perhaps a third of that amount for highway realinement. If the successful contractor chooses to use a trestle in constructing the dam, at least 5000 tons of steel will be purchased on a private order. Large quantities of sheet piling will necessarily be required for a cofferdam.

Stockholders of the low bidding firm are Griffith Co., Los Angeles; Metropolitan Construction Co., Los Angeles; Lawler & Maguire, Butte, Mont.; The Arundel Corp., Baltimore; American Concrete & Steel Pipe Co., Los Angeles; Foley Brothers, New York; D. W. Thurston, Los Angeles; Shofner, Gordon & Hinman, Denver; W. E. Callahan Co. and Gunther Shirley Co., Dallas, Tex.; A. Guthrie & Co., St. Paul, Minn.; L. E. Dixon Co., Los Angeles, and Hunkin-Conkey Co., Cleveland. Shasta Construction Co., the other bidder, is composed chiefly of the same firms now building Grand Coulee Dam, Wash.

Work is expected to start about Aug. 1.

Carnation Can Plant Reaches Capacity

MILWAUKEE.—Carnation Co., manufacturer of evaporated milk, has reached peak production at its central plant in Oconomowoc, Wis., with an output of 1,500,000 cans every 24 hr. Two 8-hr. shifts are being employed, with 250 at work. Present production requires approximately 100 tons of tin sheets a day.



Be sure you order THE hoist that is thoroughly tested under actual operating conditions before it is shipped. Let the nearest A-E-CO representative* explain how the shop-testing of Lo-Hed Hoists assures reliable performance in your plant. Ask him to explain Lo-Hed's exclusive features that give you fast, dependable operation with minimum maintenance cost. Let him show you Lo-Hed's uses in scores of industries. Find out why Lo-Hed is the logical hoist for EVERY purpose and why it is the *only* hoist for low headroom conditions.

A-E-CO Lo-Hed Hoists are built in 98 standard models—from $\frac{1}{4}$ to 12-ton capacities.

To Prevent Breakdowns
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Call him or
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AMERICAN ENGINEERING COMPANY

2410 ARAMINGO AVENUE, PHILADELPHIA, PA.



PERSONALS . . .

FLOYD A. BEATTY has resigned as senior vice-president in charge of plant operations, Lewis Foundry & Machine Co., Pittsburgh, a division of the Blaw-Knox Co. Mr. Beatty entered the steel business in 1915 as a plant engineer at Forged Steel Wheel Co., Butler, Pa., and from there went to Spang & Co. as chief engineer. He later worked for Jones & Laughlin Steel Corp. as a designing engineer and in 1925 became associated with the Lewis Foundry & Machine Co., serving successively as chief engineer,

Homestead, succeeding Mr. Ericson. Mr. Wiebel went to the company in 1933 and has been on the engineering staff in the Pittsburgh office since 1937.

♦ ♦ ♦

PHILIP O. GEIER, chairman and treasurer of Cincinnati Milling Ma-

chine Co., Cincinnati, has been selected president of the Ohio Manufacturers' Association to succeed the late Charles F. Michael, of Bucyrus. Mr. Geier has been a trustee of the association for almost 20 years.

♦ ♦ ♦

HENRY J. MOKATE has been appointed manager of sales of the new secondary products division, Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Mokate has been with U. S. Steel

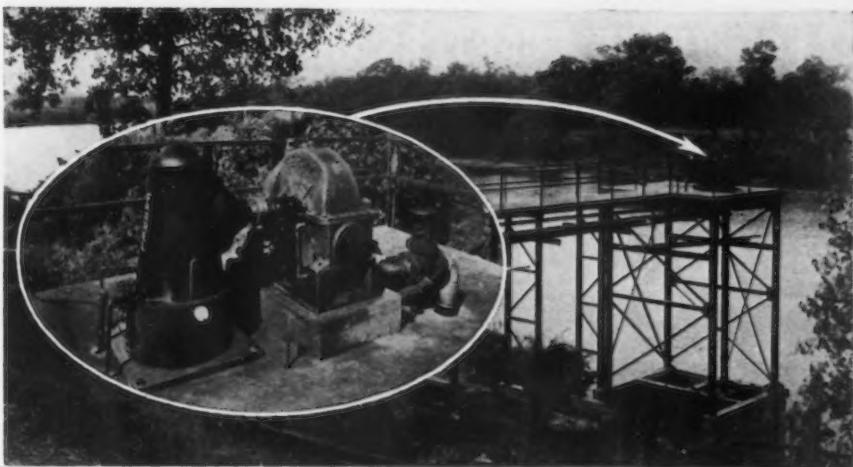


F. A. BEATTY

operating vice-president and vice-president in charge of engineering and machinery sales. Mr. Beatty is well known for his development of the three-high sheet roughing mill. He is a member of the American Iron and Steel Institute and the Association of Iron and Steel Engineers.

♦ ♦ ♦

ANDERS G. ERICSON has been appointed chief engineer at Carnegie-Illinois Steel Corp's Homestead, Pa. works, succeeding A. W. Soderberg, who has retired. Mr. Ericson has been at Homestead since 1924, having started as a draftsman. He became assistant to the chief engineer in 1935. ARTHUR V. WIEBEL has been appointed assistant chief engineer at



FARREL VERTICAL DEEP WELL PUMP DRIVE Continuous 24-Hour Service in Unusual Application

This Farrel Right Angle Vertical Unit drives a deep well pump supplying water to a southern chemical plant. It transmits 100 H.P. from a steam turbine at 3600 R.P.M. to a turbine pump at 1800 R.P.M.

Despite the fact that the unit operates continuously day and night for four to five month periods, and the drive is directly connected to the steam turbine and is also exposed to the sun, no undue heating has been experienced. The drive operates smoothly and quietly, giving efficient, trouble-free service.

Farrel Right Angle Vertical Units are used extensively for driving pumps from internal

combustion engines, steam turbines and electric motors. They are used both for increasing and reducing speed from the driving unit. Wherever installed they give dependable, economical performance under all conditions of service.

The design has been standardized in two type series, one for heavy duty and the other for relatively light service, providing a wide range of selection for powers up to 600 H.P. and ratios up to 4:1. Special ratios and special sizes for higher powers can also be furnished.

Catalog giving full details will be furnished on request.

FARREL-BIRMINGHAM COMPANY, Inc.
333 VULCAN STREET - - - - - BUFFALO, N. Y.
The Gear with a Backbone





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FOR THREE QUARTERS OF A CENTURY!



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G-H Hydraulic Balers compress scrap iron and metal into tight, smooth, uniform bales of maximum density . . . at low cost.

Compact bales command higher prices than loose, bulky scrap, save labor in handling, reduce shipping costs and permit storage of larger tonnage in limited space. Every saving a price advantage!

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Capacities—
1/4-ton to
15 tons per
hour . . .
Double and
Triple
Compression.



HYDRAULIC and ELECTRIC BALING-
PRESSES and HYDRAULIC PUMPS



J. M. CHAPPLE

Corp. subsidiary companies since 1920 when he joined the former American Sheet & Tin Plate Co. at Chicago. Since combination of the company with Carnegie-Illinois he has been resident salesman at Des Moines and later at Rockford, Ill.

♦ ♦ ♦

J. M. CHAPPLE, who has been in charge of the joint Armco International-Lincoln Electric arc welding electrode factory in Buenos Aires, Argentina, has been appointed managing director of the new manufacturing subsidiary of the Lincoln Electric Co., Cleveland, the Lincoln Electric Co. (Australia) Proprietary, Ltd., recently established at Alexandria (Sydney) Australia. For 13 years he has been associated with Armco International Corp., most of that time in foreign service. After a short period in newspaper work, following his graduation from Princeton University in 1923, Mr. Chapple joined the American Rolling Mill Co. plant at Middletown, Ohio, where he had training in every department of the company before being sent abroad.

♦ ♦ ♦

A. J. KOETSIER has been appointed superintendent of the micarta division of Westinghouse Electric & Mfg. Co. at Trafford, Pa., succeeding A. J. BASTIAN, who has been assigned to special duties in connection with the promotion of micarta products through service channels. Mr. Koetsier was formerly a member of the staff of the vice-president's office.



A. J. KOETSIER

JOHN E. SHOCK has been named plant superintendent of the Mercer Tube & Mfg. Co., Sharon, Pa., to succeed GEORGE L. HISE, who has resigned.

❖ ❖ ❖

JOSEPH H. CARTER has been elected vice-president in charge of operations, Pittsburgh Steel Co., Pittsburgh, succeeding W. C. SUTHERLAND, who has resigned. Mr. Carter's first job in the steel industry was third helper at the Sharon Steel Corp., Lowellville, Ohio. He subsequently became general superintendent of that plant in 1931. Two years ago he went to the Pittsburgh Steel Co. as general superintendent of the Monessen and Alleport plants, which position he held until his present promotion.

❖ ❖ ❖

F. J. CHRISTIE has been appointed acting general superintendent at the Vandergrift, Pa., works of Carnegie-Illinois Steel Corp. Mr. Christie formerly was assistant general superintendent. JAMES M. BORTZ has been appointed assistant to general superintendent, and E. J. PARSONS has been appointed superintendent of the open hearth and rolling mills, also at Vandergrift.

❖ ❖ ❖

HARRY W. HOLT, vice-president and sales manager of the Bohn Aluminum & Brass Co., has resigned as an active executive of that company. He continues as a director, however. Mr. Holt has been with the firm since its

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You will never know how superior Clark Bolts and Service are until you try them — Do it Today.

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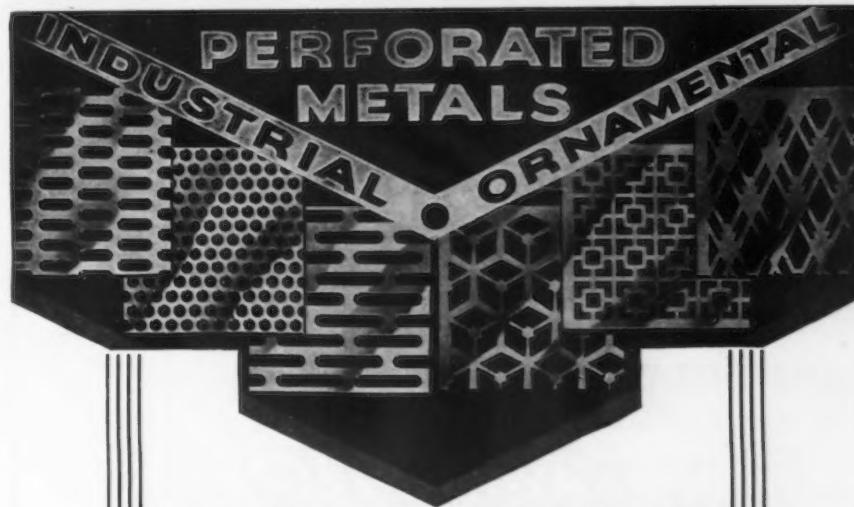
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ANY METAL • ANY PERFORATION

• The H. & K. line of perforations for industrial purposes includes a great variety of sizes and various shapes designed for efficiency and adaptability.

Ornamental perforations embrace many original and exclusive patterns as well as the standard designs.

H. and K. workmanship is unsurpassed.

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**The Harrington & King
PERFORATING CO.**

5657 FILLMORE STREET—CHICAGO, ILL.
New York Office, 114 Liberty Street

inception in 1918, having served both in production and sales capacities.

♦ ♦ ♦

THORN PENDLETON, who has been secretary and a director for the past six years of the Warren Tool Corp., Warren, Ohio, has been elected president, succeeding the late C. L. Schoonover. HOWARD MULL is the new vice-president in charge of sales, and PAUL W. FRUM is vice-president and secretary.

WALTER K. Dow, for the past year plant superintendent of the Milburn Co., Baltimore, Md., has been elected vice-president. Before becoming associated with the Milburn Co., he was identified for 10 years in a manufacturing and supervisory capacity with the DeVilbiss Co., Toledo, Ohio.

♦ ♦ ♦

RUFUS E. ZIMMERMAN, vice-president of research and technology of the United States Steel Corp., New

York, has received the degree of Doctor of Science from Franklin and Marshall College. He was graduated from that college in 1908 with a Ph.B. degree and later attended Massachusetts Institute of Technology, receiving his S.B. degree in 1911.

♦ ♦ ♦

G. C. KRUEGER has been appointed district manager of the Chicago office and warehouse of Jessop Steel Co., Washington, Pa. Mr. Krueger has been associated with the company for a number of years as salesman in the Chicago and Milwaukee territory.

♦ ♦ ♦

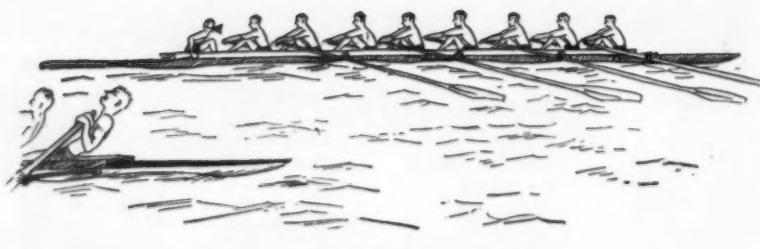
CARL GEYER has been made sales representative in Ohio and West Virginia for the Magnus Chemical Co., Garwood, N. J. RALPH NEELY has become a resident sales representative in California, and CARL STEINBERG will represent the company in sections of Pennsylvania.

♦ ♦ ♦

HAROLD W. KOST, formerly president of Prestole Devices, Inc., Detroit, has been made head of the Prestole division of the Detroit Harvester Co., Detroit, which has acquired the business of the former company.

♦ ♦ ♦

G. STEWART CRANE, vice-president of Cutler-Hammer, Inc., Milwaukee, in charge of sales, has returned from a trip to Europe, where he visited his firm's British affiliate at Bedford, England, and initiated negotiations for similar representation in France.



"Won by the Thickness of a Coat of Paint"

And many a manufacturer has won his race for public approval because of a superior metal finish. Winners must have uniformly clean surfaces within a definite time allowance, for the application of these superior finishes. Should unusual conditions exist, you will always find a Wyandotte metal cleaner equal to them, meeting your requirements.

Wyandotte
Clean - Chemically Clean
Metal Cleaners

The Wyandotte organization of practical Service Representatives can be depended on to help with your metal cleaning jobs—including the item of cleaning cost. May we co-operate?

THE J. B. FORD COMPANY
WYANDOTTE - MICHIGAN

District Offices in 27 Cities

International Nickel Program Costs \$14,000,000

TORONTO.—Robert C. Stanley, president, International Nickel Co. of Canada, announces expenditure of approximately \$14,000,000 in 1938 for a new shaft and surface plant at the Levack mine, new equipment for surface mining at the Frood mine, addition to the Copper Cliff concentrator for treatment of low grade ore, addition to the reverberatory furnace at the Copper Cliff smelter, development of the company's concession in Finland and numerous minor installations in various plants to effect economies and minimize metal losses.

...OBITUARY...

HARRISON SOUDER, of Ridgewood, N. J., died May 31, of a heart ailment at his summer home in Duxbury, Mass., aged 67 years. As general superintendent of the Cornwall (Pa.) Ore Bank Co., and as general manager of the Cornwall division of the iron mining subsidiary of the Bethlehem Steel Corporation for many years, he installed an \$800,000 electric hoisting and loading plant for open pit mining. This made possible an output from open pit and underground workings at the Cornwall iron mines of 1,500,000 tons of ore a year. He also examined iron ore and fluorspar properties in various parts of the United States for the Bethlehem Steel Co. Later he examined iron ore deposits in Spain and Algiers and magnetites in British Columbia and the East. Mr. Souder was a member of the American Institute of Mining and Metallurgical Engineers and was chairman of its committee on Eastern magnetite mining and milling methods.

♦ ♦ ♦

BYRON H. EDWARDS, founder and president of the Ideal Furnace Co. was buried at Detroit June 1. Mr. Edwards was born in Toledo on Dec. 6, 1867, and went to Detroit from Ypsilanti in 1894 to engage in the hardware business. He later was associated with the Peerless Heater Co. In 1896 he founded the Sadiron Co. and in 1898 entered the warm air register manufacturing field with the Detroit Register Co. Later, these two companies were merged into the Detroit Furnace & Heater Co. In 1903 Mr. Edwards founded the Ideal Furnace Co., which absorbed the American Sadiron Co. and the American Heater & Foundry Co. of Chicago. In recent years, home building had become a recreational hobby with him and he formed the Ideal Home Co., through which more than 500 buildings were constructed in Detroit.

♦ ♦ ♦

SAMUEL S. FAIR, president of the Valley Steel Castings Co., and a prominent businessman in the Saginaw-Bay City area in Michigan, died May 31, in the University Hospital, Ann Arbor, Mich., at the age of 64.

♦ ♦ ♦

EDDIE R. KEYES, 71 years old, former head of the H. A. Douglas Mfg. Co., inspection department, at Bronson, Mich., was buried June 2.

J. F. KOHLMORGAN, since 1924 chief engineer of the Alan Wood Steel Co., Conshohocken, Pa., died on May 28, aged 46 years. Prior to his association with Alan Wood, he was in the engineering department of Inland Steel Co. and Interstate Iron & Steel Co., both in Chicago.

♦ ♦ ♦

DANIEL F. ROGERS, consulting engineer, Westinghouse Electric & Mfg. Co., died May 30 in Atlanta, Ga. Mr.

Rogers was well known in the Pittsburgh district for his electrical construction work. He was 62 years old.

♦ ♦ ♦

LEIF LEE, consulting engineer and former chief engineer of Youngstown Sheet & Tube Co., died in Youngstown May 27, following a heart attack.

♦ ♦ ♦

JOHN GAY, 57 years old, vice-president and general superintendent of

It Pays to check with

Roots

CONNERSVILLE

when you need

AIR or GAS

handling equipment

Builders of

Quality

Equipment

since

1854

ROOTS - CONNERSVILLE BLOWER CORP.
CONNERSVILLE, INDIANA

the Schwartz Foundry Co., Detroit, died June 3. Mr. Gay was born in St. Thomas, Ont., and went to Detroit more than 30 years ago.

♦ ♦ ♦

FRED C. PHILIPS, who died June 3 in Harper Hospital, Detroit, had been a salesman in the Detroit office of the Carpenter Steel Co. for 27 years and was the oldest employee in point of service in the branch. He was born in Chicago and had been a resident of Detroit for 30 years.

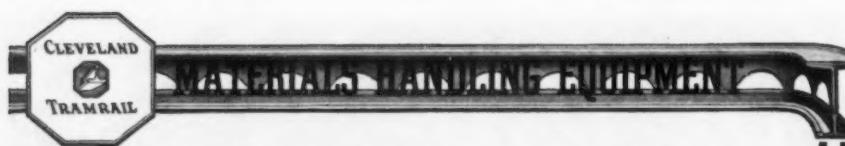
Great Lakes' New Blooming Mill

A NEW blooming mill, capable of handling 24,000-lb. ingots, is the latest addition to the Ecorse, Mich., plant of the Great Lakes Steel Corp. It was put into operation Monday, May 23, by George R. Fink, president, in the presence of a large gathering of executives and operating men.

This mill, a 46-in. reversing blooming mill, is located in line with the 96-in. continuous hot strip mill and was installed primarily to produce wide slabs for this large strip mill. The arrangement is such that slabs can be delivered directly from the blooming mill to the strip mill without rehandling or reheating. In other words, strip and plate can be produced from the initial ingot heat.

The first ingot rolled was 26 in. by 47 in. by 72 in. long and produced a slab 43½ in. by 5½ in. by 16 ft. 6 in. long, weighing 12,500 lb. This ingot was followed by another larger one 22 in. by 66 in. by 72 in. long and rolled into a slab 60¾ in. wide by 4½ in. thick. The first slab produced from this large ingot was 16 ft. 6 in. long and weighed 15,010 lb. Included in the equipment is a slab shear which has a capacity for cutting slabs which are 6 in. thick by 62 in. wide.

The mill is a high-speed type and, because of its speed, unusual precautions have been taken to lubricate it properly. The screwdown, which operates at a speed of 108 in. per min., is provided with a special oil recirculating system. An independent recirculating lubricating system has also been provided for the pinion stand. All of



In the Metal Working Industry



- In the Machine Shop, Hand operated light weight, fast, easily propelled smooth running cranes and carriers, are effective equipment for service.
- This is a two ton job with motor operated hoist.

ALSO BUILDERS OF



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CLEVELAND TRAMRAIL

DIVISION OF

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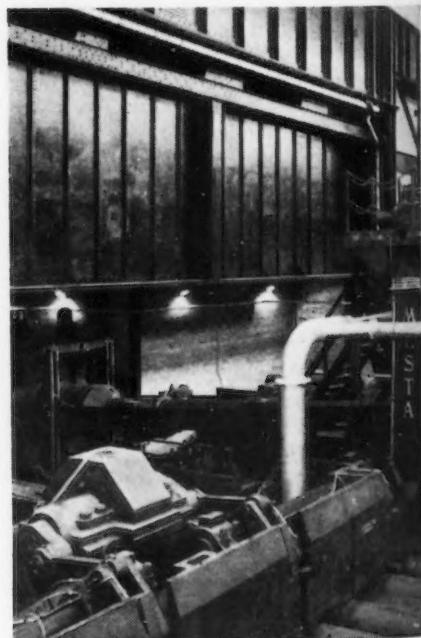
1115 Depot St.

WICKLIFFE, OHIO

Or consult your phone directory under Cleveland Tramrail.



Great Lakes Steel Corporation's



Capable of Handling 24,000 lb. Ingots

the table rollers, bearings and auxiliary equipment are lubricated by several automatic grease lubricating systems.

Housed in New Building

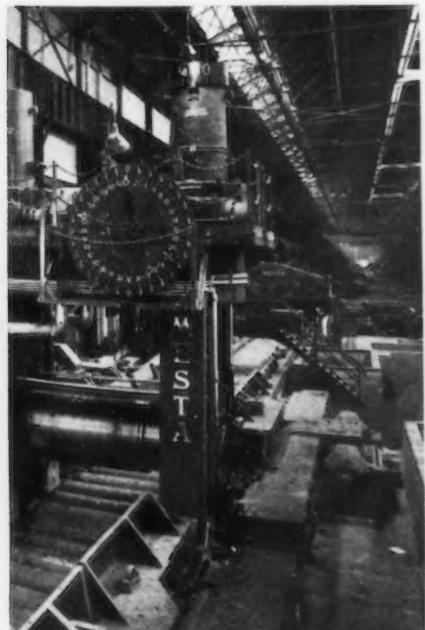
The new mill is housed in a building 100 ft. wide by 250 ft. long. The building has a 41 ft. 6 in. height to the top of the crane rail and is 55 ft. high from the floor to the bottom chord of the roof truss.

The motor room, which houses a 7000 hp. reversing 600-volt d.c. motor, motor generator sets, control, etc., is 60 ft. wide by 142 ft. 6 in. long. It is of brick construction with an insulated steel roof deck. Like the strip mill motor room, it has no windows, all equipment being air-cooled and the building ventilated.

Unusually long spindles are used between the pinions and the mill rolls, the mill having a lift of more than 66 in. The screwdown, which operates 108 in. per minute, has a Ward-Leonard control and Ward-Leonard control is also used on the front and back mill tables, manipulator, and slab shear.

Crops from the slab shear are dropped on an underground conveyor, which carries them outside the building, discharging them into a crop pit. The crop pit is served by an overhead

new blooming mill.



electric crane with magnet for handling the crops from the pit to railroad cars.

The mill is served by 75-ton and 25-ton cranes.

The slab shear is equipped with a motor-driven gage, permitting the

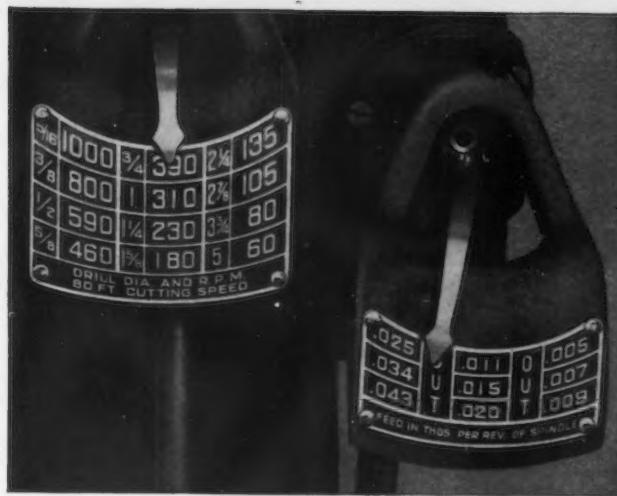
cutting of slabs having a maximum length of 21 ft. The table from the slab shear is equipped with a 25-ton scale so that each slab is weighed at the shear after being cut to its proper length. From the shear the slabs are transferred across the building to the slab yard, which is adjacent to the mill building. This transfer is approximately 100 ft. center to center of tables.

From the slab transfer tables the material is delivered to pilers, from

All geared 21" 24" and 28" SUPER SERVICE UPRIGHTS

featuring

**DIRECT
READING
SPEED
and
FEED
PLATES**



● A wide range of useful speeds and feeds are instantly available on Super Service Upright Drills with convenient single lever control.

The speed plate at the left shows at a glance the 12 spindle speeds provided progressively from 60 to 1000 r.p.m. on the 24" and 28" machines. On the 21" machine, 9 speeds are available.

● At the right is shown the feed plate which on the 24" and 28" machines provides 9 rates of feed from .005" to .043" per revolution. On the 21" machine 4 rates of feed are provided.

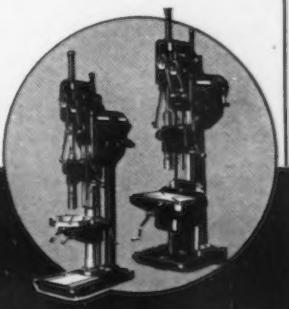
By providing quick easy selection of feed, closely graded in range,

fine feeds are available for small drills, coarse feeds for large drills and fast feeds for reaming. Every tool used can be operated to the economical limit of its endurance.

Other features that make for long life and efficiency include: ball and roller bearings, heat treated alloy steel gearing, positive type feed clutch, automatic depth gauge and table arm controls at front of machine.

Write for Bulletin U-22.

**THE CINCINNATI BICKFORD
TOOL COMPANY**
OAKLEY - CINCINNATI - OHIO - U. S. A.



where it is delivered either directly to the slab heating furnaces or handled by overhead cranes and stored in the slab yard.

The mill and tables were built by Mesta Machine Co. and the motors and electrical equipment were furnished by the Westinghouse Electric & Mfg. Co.

The foundations, buildings, and auxiliary equipment were designed and installed under the direction of the Great Lakes Steel Corp.'s engineering department.

Dr. Sauveur to Address A.S.T.M. Annual Meeting

D R. ALBERT SAUVEUR, professor emeritus of Harvard University, will deliver the Edgar Marburg lecture at the 41st annual meeting of the American Society for Testing Materials, to be held in Atlantic City, N. J., June 27 to July 1. Dr. Sauveur's topic will be "The Torsion Test," and his lecture will include a description of a specially built tor-

sion machine and will outline the significance of the autographic torque-twist curve and the desirability of a close study of the torsion test from the standpoint of a routine testing method.

Dr. A. E. White, president of the testing society, will discuss "Industrial Research," dealing with questions affecting research in industrial and university laboratories and related fields.

Seventeen sessions embracing 104 technical papers and reports are scheduled for the meeting. These technical papers will deal with such topics as impact testing, radiography, metallography, fatigue of metals and corrosion. Specialized phases of steel, ferroalloy and non-ferrous metal testing are also listed for discussion.

26 Members Join Scrap Institute during May

TWENTY-SIX new members joined the Institute of Scrap Iron and Steel in May, Benjamin Schwartz, director general of the institute, announced. With a continuous increase of membership during every month of the last 12, enrollment has reached a new high with a total of 713 firms. With the addition of five new chapters during the past year, there are now 19 chapters of the Institute in the principal scrap markets of the country.

Farrel-Birmingham Honors 130 Employees

FARREL-BIRMINGHAM CO., INC., machinery manufacturer, held its second annual service banquet at Ansonia, Conn., for 130 men who have been with the company for a quarter century or more. Nelson W. Pickering, president of Farrel-Birmingham, was toastmaster, and Franklin Farrel, Jr., chairman of the board, presented awards to veteran employees. Chief speaker was Louis M. Ruthenburg, president of Servel, Inc.

Packer Machine Purchases New Factory at Meriden

PACKER MACHINE CO., Meriden, Conn., pioneer builder of automatic polishing and buffing machines, has purchased a new factory at 452-456 Center Street, Meriden. The building will include an electric welding department to facilitate handling of welded construction.

AIRLESS BLAST CLEANING EQUIPMENT



THE NEW PANGBORN ROTOBLAST "ROCKER" BARREL

An Airless Cleaning Machine Designed to Handle Flat, Mixed, Long and Fragile Work. Also All General Cleaning Work.

THIS compact Airless Barrel, with its Folding Conveyor Drum, is Pangborn's answer to the demand of industry for a super cleaning machine. Designed for flat, mixed, long and fragile work, as well as all the usual sizes and types of gray iron, steel, alloy and malleable castings; forgings; steel products and heat-treated parts, etc., this machine gives fast cleaning with low power, labor and maintenance costs. Made in 7, 14, 21 and 28 cubic feet capacity.

Write for Bulletin No. 210

PANGBORN CORPORATION • HAGERSTOWN, MARYLAND
THE WORLD'S LARGEST MANUFACTURER OF BLAST CLEANING AND DUST CONTROL EQUIPMENT

PANGBORN

Life of Ingot Molds

(CONTINUED FROM PAGE 27)

the report, which had an average of 60 ingots. On further examination of that particular paper, there appeared to be a pronounced difference in the chemical composition of the mold iron—higher manganese, lower silicon, and a somewhat higher phosphorus content than any of the British mold irons. That difference in mold life and composition was so great, that additional comments on this would be appreciated.

There was one other point of interest more perhaps from the operating point of view. On large molds he believed it was possible to chip out surface defects and weld in a cast iron filling. It would perhaps be interesting to know if any of the members present had experience with such a practice.

Mr. Hinchcliffe thought they would find that generally speaking, the molds dealt with in the American paper were larger than molds used over here, and failure generally was by deterioration of the surface both by crazing and by cavitation, and erosion of the mold. The Committee had noted Mr. Reagan's remarks and agreed that higher manganese and lower silicon generally were beneficial. But he did not think they could compare Mr. Reagan's results with those obtained directly in this country, because they had no opportunity of observing the conditions of surfaces in America. They did not know enough about the mold.

Mr. Binks said he had selected that paper (Mr. Reagan's) as a foreign expert's view upon the mold issue. All his failures would be crazing, but he thought Mr. Reagan's general conclusion was that cracking came from the design—some fault or little defect—that failed by cracking in addition. That was the structure of Mr. Reagan's paper, and the difference in the mold life attained at his works—200—was so great that he (Mr. Binks) thought it should be brought out more strongly.

J. G. Pearce added that on the last point the life of the ingot mold was in number of heats and was not a thing which could be used, as he mentioned earlier, as between one plant and another. The true criterion as Mr. Hinchcliffe had hinted, was the pounds of mold used per ton of steel, and they had reason to believe that that figure was very much higher

for Mr. Reagan's methods, but his extra life was not really worth anything to him. In other words, the British and the American methods would compare quite favorably, but it was a fact—and perhaps Mr. Myers would agree—that the majority of British ingot molds did fail by cracking. They believed that cracking was a matter

that could be dealt with by attention to design in individual cases, and that was why they wanted Mr. Hinchcliffe to visit works to see if anything could be done to improve cracked failures in order to bring about the state of affairs whereby they could expect them to fail by crazing or by failing simultaneously at the end of their life by cracking and crazing together.

R. P. Smith said there was one factor which might throw some light on the question. The failure of a mold



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was a relative term. What was the failure of a mold? If they wanted the shrink and watched them stripping their ingots they would see them forcing their ingots out of the mold by a machine. They kept forcing them out, but when they had to use such force they actually had to take a certain amount of the mold metal in forcing them out. Mr. Smith said as soon as an ingot stuck with them, out the mold came. If ever they went to Germany—and he thought the same applied to the United States—they would find the coarse mold and a ma-

jority far beyond the limit they themselves thought was good steelmaking.

Mr. Roxburgh said, with regard to the manufacture of the ingot molds, the question of the composition of the metal seemed to him to be unduly stressed. Naturally, the composition of any metal was important, but really it was only a guide. What to him was important was the materials which he used in order to obtain such a composition, and also the ultimate structure of the metal. On the one hand, they heard remarks about soft metals and hard metals, and naturally

one liked to know more of the structure of the materials. He felt that in the question of the structure there were two very important points, the first being the amount of combined carbon present in the iron, and, second, the form of the graphite present.

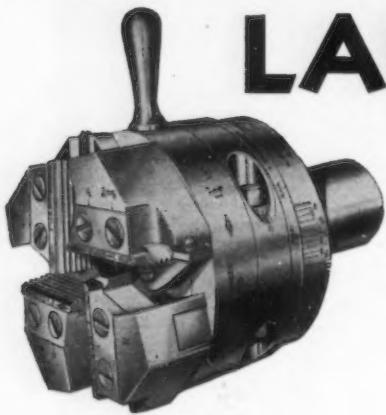
A. Allison said that there was one point he thought Mr. Pearce had missed in connection with low-silicon pearlitic iron. They were relieving the casting stress of the mold. Mr. Pearce mentioned temperatures of 450 deg., and also going up to 800 deg., but he thought it had been shown by Dr. Bellan that the maximum stress relief in cast iron occurred at a temperature of just over 600 deg. C. Generally speaking, high manganese in light molds seemed to give a decided advantage. They had to remember when they got the high manganese—1 per cent and over—there were certain stabilizing effects upon the carbon, and he thought on the whole, for light molds, that stabilizing effect was a decided advantage.

Mr. Hinchcliffe said he was afraid he did not agree with Mr. Allison as regarded the annealing of low silicon pearlitic iron except in certain special cases. That was where the mold failed by cracking in the first, second, or third case. He thought that all effective annealing was destroyed and was replaced by new and greater stresses by the heat treatment of the steel, and by more or less rapid cooling after the ingot had been removed.



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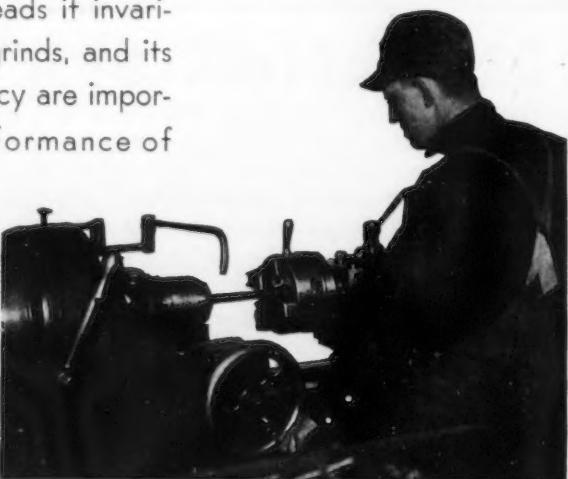


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Incandescent Electric Carbon Brazing Described

(CONTINUED FROM PAGE 33)

spots, or "burning" the surface of the work through too rapid heating. It is of particular advantage when operators are new to the job. The hard type has considerably greater surface resistance and operators should be given a certain amount of training prior to using it. Its major advantage lies in the fact that brazing temperatures can be had with approximately 30 per cent less current.

The extra hard electrode has the highest surface resistance and the danger from burning the joint surface is such that it should only be used by skilled operators. Its outstanding advantage is that it offers top brazing temperatures with only about 50 per cent of the current required by the soft type electrode. This means

that comparatively large joints can be made with standard brazing equipment.

Investigations have shown that the best silver-brazed joints are obtained when there is some degree of diffusion between the alloy and the metal. Diffusion is a time and temperature reaction and will vary with the type of metals joined. With a majority of non-ferrous alloys microscopic examinations show this diffusion. With steel and alloys that have melting points several hundred degrees above that of the brazing alloy, it is more difficult to positively determine this point, but evidence obtained seems to justify the statement that some degree of diffusion is present in all properly made silver-brazed joints.

A basic reason for the consistently good joints made by the incandescent carbon brazing method is that the joints are heated under pressure. In making lap joints, for example, the members are clamped between the electrodes under sufficient pressure to hold the parts securely together and make full even contact. The current is usually applied intermittently, so that the heat is evenly distributed throughout the electrodes, thus avoiding hot spots. Heating continues until the proper brazing temperature is reached, indicated by the free flowing of the brazing alloy.

In making butt joints on materials up to 1-in. wide, the ends to be joined should be square to utilize the maximum contact areas. The ends should be butted tightly together and the electrodes applied to the thin sides of both members. Straight butt joints can be used on metal $\frac{1}{8}$ -in. thick and under, but on heavier metals the members must be scarf'd, approximately three times the thickness of the joint members.

When cable is to be brazed, the strands should be wrapped so that they will retain their position. The cable should then be flattened and assembled between the electrodes. Heating is the same as in making lap joints, but the brazing alloy must be applied at the cut end.

Where the work to be brazed is of such a nature that it can be brought to a definite point it is generally advisable to use stationary equipment, on which joints of practically any size can be made. The equipment usually consists of a press and apparatus to control the motion of the electrodes. Pressure is produced by means of an air cylinder or a mechanical lever. Larger-size transformers are usually used with this equipment and leads

can be made heavy enough to carry the maximum current without heating and, if necessary, the electrodes can be water-cooled. Likewise, air cylinders and levers can be made to supply any required pressure. Presses of this kind, with capacities up to 100 kva., are in constant use. For press work, the soft-type electrode is most commonly used.

A question frequently asked in connection with the use of silver alloys is in regard to their corrosion resistance. It compares favorably with

that of copper, copper alloys, nickel silver, and nearly all of the non-ferrous metals and alloys which are used for their corrosion-resisting properties. Silver alloys are attacked by nitric acid, but so far as ordinary atmospheric corrosion is concerned, their resistance is similar to that of the different metals and alloys with which they are used. The problem of galvanic corrosion is probably the most important to be considered when joints made with silver alloys are subjected to various corrosive agents.

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Coal Operators Organize In Western Pennsylvania

IN an attempt to eliminate competition existing since coal prices set by the Guffey bill were withdrawn, western Pennsylvania coal operators are organizing a marketing association under the Guffey Coal Act, to be known as the Western Pennsylvania Coal Corp.

Members will agree on prices for

the market area being served but they must be approved by the National Coal Board. Two such marketing agencies in other areas are now in existence. The Smokeless Coal Corp. serves southern and eastern West Virginia and Virginia, and the Appalachian Coals, Inc., serves western West Virginia.

Ultimate success of these agencies is said to depend on establishment of similar organizations in other terri-

ties. It is likely that Ohio, Northern West Virginia and central Pennsylvania operators will form similar groups.

These organizations are more or less of a stop-gap until the Guffey coal prices to be set by the National Coal Board after hearings are reinstated. Payment for coal sold by members will be made to the agency which is expected to prevent price cutting.

Algoma Awards Tin Plate Mill Contracts

TORONTO.—Sir James Dunn, president of Algoma Steel Corp., Sault Ste. Marie, Ont., announces a \$2,000,000 building program to include a tin plate mill and plant for production of balls for use in mining mills. Chief contracts for the tin plate mill already have been awarded.

Algoma Steel is said to have contracts with Continental Can Co., under which Algoma will supply 70 to 75 per cent of Continental requirements in Canada. Capacity of the mill as planned will be 30,000 tons of tin annually.

Enameling Club Hears Address on Steel

IMPORTANCE of porcelain enamel on steel as one of the modern architectural materials was discussed at a meeting of the Eastern Enameling Club at Baltimore, May 22, by Prof. R. M. King, technical director, Porcelain Enamel Institute.

"Porcelain enamel on steel," Prof. King told his audience of 125 operating men from Eastern porcelain enameling plants, "is aiding the architect with modern ideas to satisfy the public with a variety of form and color and to attain a maximum of magnificence with a minimum of material and money."

British Pig Iron Prices Stabilized to Dec. 31

LONDON (By Mail).—The secretary of the British Pig Iron Producers' Association has announced authoritatively that a definite agreement has been reached to stabilize prices of foundry and forge pig iron controlled by the association to Dec. 31.

A recent announcement by the association was limited to the declaration that there was to be no alteration as of July 1 next.

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All Obstacles Removed for Renewal of European Steel Cartel

LONDON, June 7 (By Cable).—The Belgian steel industry is now agreed on the distribution of its domestic quota thus removing the last obstacle to the renewal of the International Raw Steel Cartel which, therefore, is confidently expected to be renewed at the Paris meeting on June 16.

Holiday conditions prevail throughout the industry. More blast furnaces are damped.

Tin plate operations are at 35 per cent.

Black sheets for export are reduced a further 5s.

♦ ♦ ♦

Cartel Understanding With U. S. Confirmed

LONDON (By Mail).—Over 160 delegates from 15 nations attended the recent conference of the International Steel Cartel at Rome. At the conclusion of the conference the following official statement was issued:

"The first meeting, which was that of the International Steel Entente, presided over by Dr. Meyer (Luxembourg), confirmed the understandings and future developments of the agreements between the various cartels, especially with regard to the American Steel industry.

"The second meeting, at which the chair was taken by Dr. William Firth (Great Britain) dealt with the subject of tin plate and reached an agreement in principle for the renewal of the cartel until June 30, 1941.

"The meeting of the Railmakers' Association, presided over by the Italian representative, Signor Ardissoni, examined the situation of the international market and confirmed the undertakings already in force.

"The fourth meeting, presided over by Dr. J. Elliot (Great Britain), dealt with the question of scrap and reconfirmed the understanding between European consumers of scrap, determining the methods of acquisition in the world market.

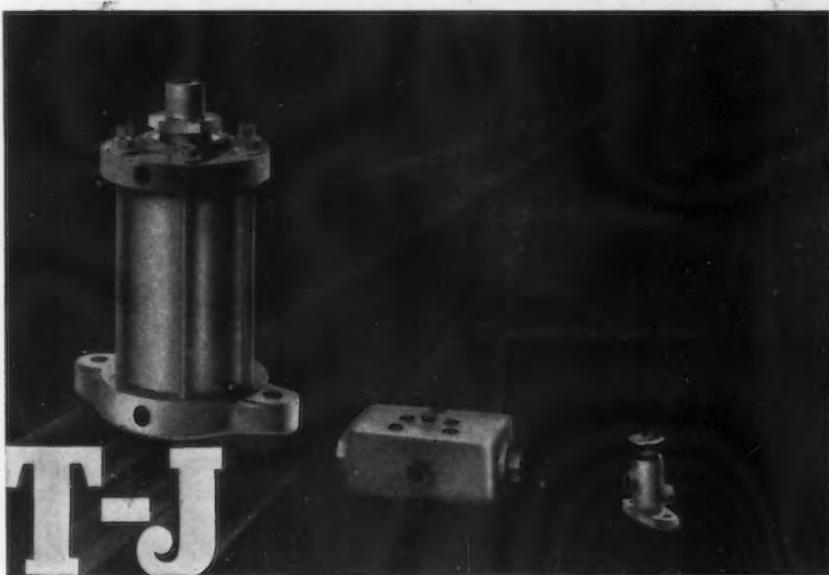
"The Italian delegation, headed by Signor Vincenzo Ardissoni, president of the National Fascist Association of Metallurgical Industrialists, took part in the last three meetings. The work of the conference has taken place in the last two days at the headquarters

of the Fascist Confederation of Industrialists."

NLRB Issues Complaint Against Walworth Co.

CHICAGO, June 7.—A complaint by the NLRB today alleged violation of the Wagner Act by the Wal-

worth Co., manufacturer of valves, pipe fittings and pipe tools. The complaint was based on a SWOC charge that the company had interfered with the right of employees in its Kewanee, Ill., plant to join labor organizations of their own choosing. Nearly 2000 workers were made idle by a strike at this plant last week when employees rejected an 11 per cent pay cut, following the acceptance of such a reduction at the company's plant at Greensburg, Pa.



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Engineers, Not Reformers, Make Jobs, Girdler Tells Case Men

ENGINEERING research can do more to solve the unemployment problem than "all the so-called reformers combined," Tom M. Girdler, chairman Republic Steel Corp., said this week at a Case School alumni luncheon in Cleveland.

The engineering type of mind, Mr. Girdler said, is needed in Government

at this moment as "a balance to the forces which are seeking to bring about revolutionary changes—to alter our economic system, to undermine our liberty and to destroy our system of private enterprise."

While these are not the avowed objectives, the attempt is quite clearly being made, whether by impractical



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humanitarians or destructive schemers to abolish the system of private enterprise, private property and private business, the Republic executive said. "They would strike a dagger into the heart of the profit system, from which comes the life blood of private enterprise.

"We are faced with great problems in this country . . . but they will not be solved by destroying that which is good in our system or throttling the constructive and creative forces now existing. What we need are new methods of producing more goods and cheaper goods, goods that will be available to more people and the production of which will provide more jobs," Mr. Girdler said.

The Republic executive warned that business must take a greater interest in politics and government since the power of government to regulate industry in ways undreamed of a few years ago is now established by law. The answer to whether this regulation is to be regimented control, the collectivist state or some other form of planned economy lies in the hands of the people of America, he said.

Wickwire-Spencer to Build New Wire Mill

THE Wickwire-Spencer Steel Co., 41 East 42nd Street, New York, will build a new wire mill at Buffalo to cost \$500,000, according to an announcement by E. C. Bowers, president. Bids have been asked for and work on the building will be started as soon as possible.

Five plants are now being operated by the company in New England. These will not be completely abandoned, but some of the heavier tonnage items will gradually be moved to the new Buffalo mill.

Italy Gives T. E. Milsop An "Honorable" Title

BECAUSE of his distinguished service as Army Aviation corps captain during the World War, Thomas E. Milsop, Weirton Steel Co. president, this week received from Italy's royal ministry of foreign affairs a message which said:

"It gives me pleasure to announce to you that His Majesty the King Emperor, my August Sovereign, has deigned to confer upon you the honorific title of Knight of the Order of the Crown of Italy."

Put Idle to Work, SWOC Tells Business, Then Calls Strike

PITTSBURGH.—Adoption of a resolution asking the President to call a conference of business, banking, labor and farm leaders, "to cooperate in a program to end the recession and put people back to work," highlighted a meeting of Steel Workers' Organizing Committee sub-regional directors at Pittsburgh early this week.

* * *

CHICAGO.—A strike sponsored by the SWOC was called at the North

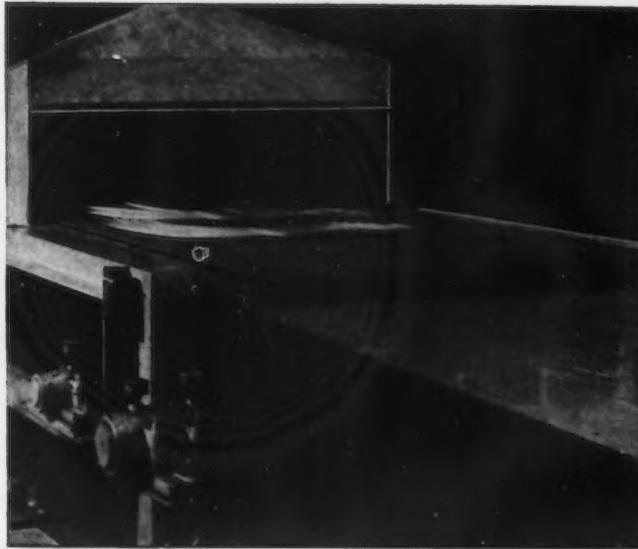
Chicago, Ill., plant of the Chicago Hardware Foundry Co. Monday in protest against the company's announcement that business conditions do not warrant a week's vacation with pay for the 450 employees as was done last year and its request that employees accept a sliding wage scale with increases when business is good and reductions when conditions are poor, a 10 per cent cut to be effective immediately.

AFL to Tell Its Story Over 55 Radio Stations

WASHINGTON.—To offset publicity given John L. Lewis, the AFL shortly will broadcast weekly (monthly at the start) radio programs from 55 stations with a feature called "The Labor Parade." Publicity advisers of William Green call the broadcast, which will keep the public informed of "outstanding labor news," the most "ambitious radio program ever undertaken by labor."



A PANTOGRAPH type of tube suspension is used for the 400,000-volt G-E X-ray equipment used at the Schenectady Works for checking turbine and other castings and parts. Such equipment clearly shows the internal make-up of a section of steel 5 in. thick.

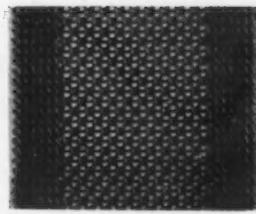


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Their engineers chose the "Cambriloy" mesh belt with "Duplex Selvage" because the open mesh provides low thermal capacity . . . spells fuel economy . . . permits complete heat circulation, which in turn insures a uniform production. The "Duplex Selvage" was naturally specified as it provides double strength at the belt's high-wear point—the selvage. It adds countless extra hours of service . . . offers freedom from operation difficulties.

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Senate Group Backs \$500,000 O'Mahoney Anti-Trust Inquiry

WASHINGTON.—The Senate Judiciary Committee on Monday ordered a favorable report on the O'Mahoney resolution calling for a \$500,000 anti-trust investigation requested by President Roosevelt on April 29.

(Developments in this story came after the anti-trust inquiry article elsewhere in this issue was written.)

The revised O'Mahoney resolution provides for a joint committee of three senators, three representatives and one official each from the Departments of Justice, Commerce and Treasury, the Federal Trade Commission

and the Securities and Exchange Commission.

The investigation, if finally ordered, promises to be extensive. It is directed toward basic industries, from which many witnesses undoubtedly would be called before the committee. The committee is given power of subpoena.

RFC Railroad Loan Bill Being Revived

WASHINGTON.—Reports that the RFC railroad loan bill is being revived has been confirmed by

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railroad spokesmen who declined, however, to indicate whether railroad management was behind the move.

After a White House conference presumably on that subject, Jesse Jones, RFC chairman, was reported to have conferred with labor representatives in an attempt to compromise their stand that loans should not be made in the face of threatened wage reductions.

Senator Wagner, author of the bill on the Senate side, had previously indicated he had abandoned hope for passage at this session, but said on Friday that there was "some hope" of enacting an amended draft. Other Congressional members expressed a similar view despite the last minute adjournment shuffle.

There was some talk that a revised bill might eliminate the equipment loan provision, limiting the funds to work loans. Jones has insisted from the start that most of the money would be borrowed for repair and maintenance work rather than for the purchase of new equipment.

Washington Denies Politics Affects Auto Case Handling

WASHINGTON.—Department of Justice officials deny reports that the Government is anxious to drop charges of anti-trust violation in indictments returned recently in South Bend, Ind., against "the big three" automobile manufacturers and their affiliated finance companies.

A published report on June 3 said that the department had such a move under consideration because of "political complications" in Indiana involving James R. Fleming, district attorney who obtained the indictments. The story described Fleming as "a protege of Senator Minton," of Indiana, and noted that Minton, whose resolution calling for an FTC investigation of the automobile industry has been given Congressional and White House approval, has been gunning for the automobile industry for political reasons.

Spokesmen for the Justice Department minimized the report, pointing out that the department knows nothing about the reputed "political complications," and plans to go ahead with the case which named the Ford Motor Co., the General Motors Corp., and the Chrysler Corp., and their affiliated finance companies, together with 59 executives, alleging a conspiracy to promote monopoly by forcing dealers to finance automobile sales through their affiliated finance companies.

May Pig Iron Output

Drops Almost 12 Per Cent

PRODUCTION of coke pig iron in May totaled 1,255,024 gross tons, compared with 1,376,141 tons in April. The daily rate last month dropped 11.7 per cent from that in April, or from 45,871 tons to 40,485 tons.

On June 1 there were 72 furnaces making iron, operating at the rate of 37,225 tons daily, compared with 79 furnaces in blast on May 1, producing at the rate of 42,310 tons daily. Nine furnaces were blown out or banked during the month and two were put in operation. The Steel Corporation put one in blast and took two off blast. Independent steel producers blew out or banked five furnaces and merchant producers blew one in and blew out or banked two furnaces.

Among the furnaces blown in were the Troy furnace of the Troy Furnace Corp. and a Monongahela unit of the National Tube Co.

Furnaces blown out or banked included: One Swede, Alan Wood Steel Co.; one Aliquippa and one Eliza, Jones & Laughlin Steel Corp.; one Haselton, and one Pioneer, Republic Steel Corp.; one Federal, Interlake Iron Corp.; one Madeline, Inland Steel Co., and two Ensley furnaces of the Tennessee Coal, Iron & Railroad Co.

Production by Districts and Coke Furnaces in Blast

	Production (Gross Tons)		June 1		May 1	
	May (31 Days)	April (30 Days)	Number in Blast	Operating Rate, Tons a Day	Number in Blast	Operating Rate, Tons a Day
Furnaces						
New York:						
Buffalo	92,758	92,386	5	2,990	6	3,590
Other New York and Mass.	10,756	—	1	385	—	—
Pennsylvania:						
Lehigh Valley	43,272	45,961	4	1,395	4	1,530
Schuylkill Valley	12,063	11,422	0	—	1	380
Susquehanna and Lebanon Valleys	13,583	14,767	1	440	1	490
Ferromanganese	—	—	0	—	0	—
Pittsburgh District	207,984	267,915	10	5,770	12	7,510
Ferro. and Spiegel	7,640	11,174	2	300	1	175
Shenango Valley	20,470	17,117	1	660	1	570
Western Pennsylvania	34,286	24,373	2	1,105	2	815
Ferro. and Spiegel	5,701	4,790	1	185	1	160
Maryland	82,521	72,711	4	2,660	4	2,425
Wheeling District	82,629	96,694	5	2,670	5	2,900
Ohio:						
Mahoning Valley	95,847	121,034	5	2,700	6	3,590
Central and Northern	75,562	78,767	5	2,435	5	2,625
Southern	22,076	22,376	3	710	3	745
Illinois and Indiana	258,740	267,604	11	7,490	13	8,920
Michigan and Minnesota	42,199	38,422	3	1,360	3	1,280
Colorado, Missouri and Utah	17,699	18,383	2	570	2	615
The South:						
Virginia	—	—	0	—	0	—
Kentucky	10,665	12,245	1	235	1	410
Alabama	118,573	155,106	6	3,165	8	4,065
Ferro. and Spiegel	—	2,894	0	—	1	95
Tennessee	—	—	0	—	0	—
Total	1,255,024	1,376,141	72	37,225	79	42,310

Daily Average Production of Coke Pig Iron

	1938	1937	1936	1935	1934
January	46,100	102,597	65,351	47,656	39,201
February	46,367	107,115	62,886	57,448	45,131
March	46,854	111,596	65,816	57,098	52,243
April	45,871	113,055	80,125	55,449	57,561
May	40,485	114,104	85,432	55,713	65,900
June	—	103,584	86,208	51,570	64,338
½ year	—	108,876	74,331	54,138	54,134
July	—	112,866	83,686	49,041	39,510
August	—	116,317	87,475	56,816	34,012
September	—	113,679	91,010	59,216	29,935
October	—	93,311	96,512	63,820	30,679
November	—	66,891	98,246	68,864	31,898
December	—	48,075	100,485	67,950	33,149
Year	—	100,305	83,658	67,556	43,592

Production of Coke Pig Iron and Ferromanganese

	Gross Tons		Ferromanganese	
	Pig Iron*	Ferromanganese	1938	1937
January	1,429,085	3,211,500	22,388	23,060
February	1,298,268	2,999,218	20,205	24,228
March	1,452,487	3,459,473	21,194	27,757
April	1,376,141	3,391,665	18,607	26,765
May	1,255,024	3,537,231	13,341	34,632
June	—	3,107,506	—	34,415
½ year	—	19,706,593	—	170,857
July	—	3,498,858	—	23,913
August	—	3,605,818	—	29,596
September	—	3,410,371	—	26,100
October	—	2,892,629	—	26,348
November	—	2,006,724	—	25,473
December	—	1,490,324	—	22,674
Year	—	36,611,317	—	324,961

*These totals do not include charcoal pig iron.

†Included in pig iron figures.

Merchant Iron Made, Daily Rate

	Tons				
	1938	1937	1936	1935	1934
January	10,635	16,106	10,537	3,926	7,800
February	8,854	16,514	11,296	6,288	7,071
March	8,524	16,457	10,831	7,089	7,197
April	8,273	14,517	13,897	8,799	8,838
May	6,431	19,483	12,814	8,441	9,099
June	—	15,870	14,209	7,874	9,499
July	—	19,609	11,619	8,644	7,830
August	—	17,831	12,148	8,194	6,043
September	—	20,065	12,526	10,090	4,886
October	—	18,950	13,645	11,199	5,765
November	—	15,662	14,739	12,503	6,610
December	—	10,964	14,852	13,312	4,399

U. S. Awards Contract For Four Cargo Boats

WASHINGTON.—The Maritime Commission has awarded an \$8,320,000 contract to the Newport News (Va.) Shipbuilding & Dry Dock Co., for four standard steel cargo vessels of the C-2 design. An estimated 14,500 tons of steel will be required, officials said. The contract called for completion of the ships in 600 days.

April Zinc Exports Below Year Ago

THE Metals and Minerals Division of the Bureau of Foreign and Domestic Commerce reveals exports of zinc were valued at only \$154,865 in April, 1938, as against \$167,372 in March, and \$157,939 in April, 1937. April imports were \$38,559 against the March figure of \$67,501 and the \$95,422 in April, 1937.

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

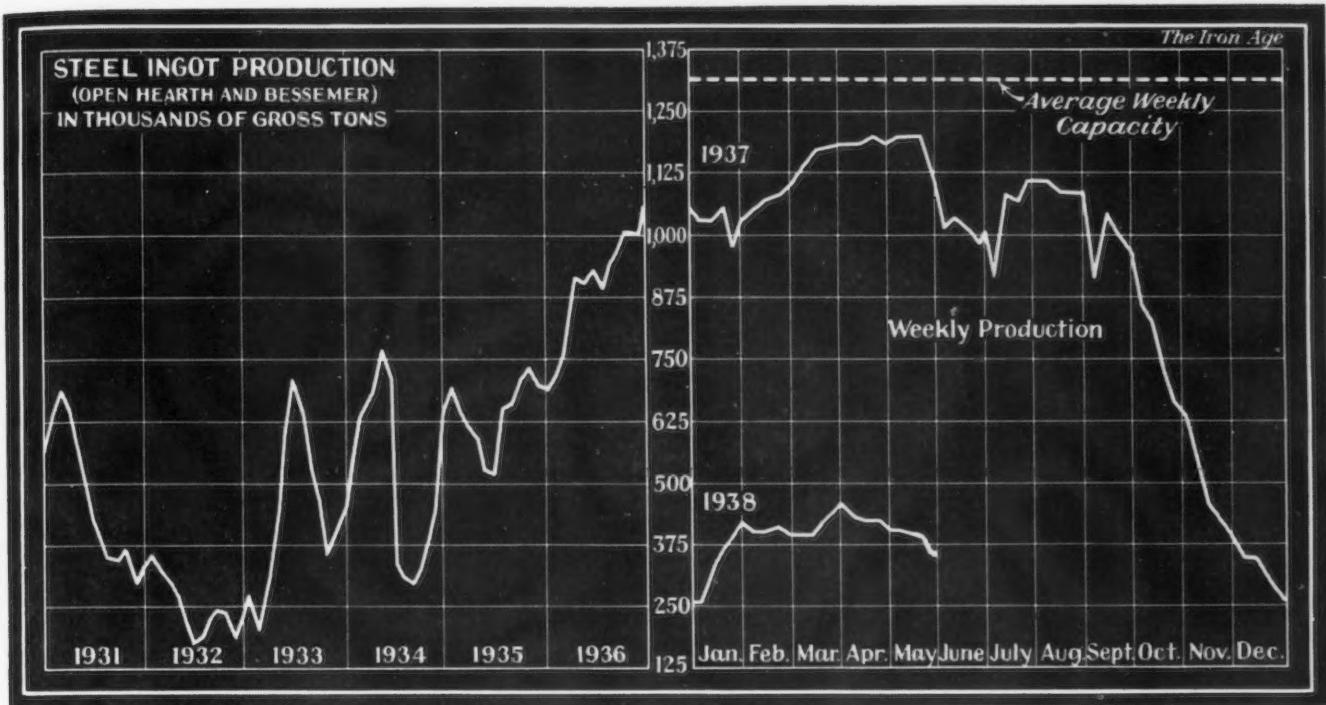
	May 1938	April 1938	May 1937	Five Months 1937	Five Months 1938
Steel Ingots: (gross tons)					
Monthly output ^a	1,806,805	1,925,166	5,151,909	24,574,237	9,180,867
Average weekly output ^a	407,857	448,757	1,162,959	1,138,750	.....
Per cent of capacity ^a	30.39	33.44	88.79	84.86	.....
Pig Iron: (gross tons)					
Monthly output ^b	1,255,024	1,376,141	3,537,231	16,599,087	6,811,005
Raw Materials:					
Coke output ^c (net tons) .....	.....	2,510,964	4,798,511	23,216,313	.....
Lake ore consumed ^d (gross tons) .....	.....	1,853,658	5,321,011	24,715,312	.....
Castings: (net tons)					
Malleable, orders ^e .....	.....	19,724	46,018	291,717	.....
Steel, orders ^e .....	.....	.....	68,688	540,373	.....
Finished Steel: (net tons)					
Trackwork shipments ^f .....	.....	3,793	8,807	54,814	.....
Fabricated shape orders ^f .....	.....	92,130	122,939	728,831	.....
Fabricated plate orders ^f .....	.....	.....	28,913	216,412	.....
U. S. Steel Corp. shipments ^f .....	.....	501,972	1,304,039	6,345,724	.....
Fabricated Products:					
Automobile production ^g .....	.....	238,133	540,377	2,396,315	.....
Construction contracts ^h .....	.....	\$222,016 [†]	\$244,113 [†]	\$1,176,377 [†]
Steel furniture shipments ⁱ .....	.....	.....	\$2,259 [†]	\$11,483 [†]
Steel boiler orders ^e (sq. ft.) .....	.....	474,931	1,015,282	4,793,138	.....
Locomotives ordered ^k .....	.....	3	14	206	.....
Freight cars ordered ^k .....	.....	3	3,903	44,562	.....
Machine tool index ^l .....	.....	90.3	208.5	234.2 [†]
Foundry equipment index ^m .....	.....	79.3	237.6	248.1 [†]
Exports: (gross tons)					
Total iron and steel ^r .....	.....	489,202	1,043,489	2,790,426	.....
All rolled and finished steel ^r .....	.....	129,252	443,891	1,632,430	.....
Scrap ^r .....	.....	306,900	630,671	1,620,114	.....
Imports: (gross tons)					
Total iron and steel ^r .....	.....	21,237	49,050	253,743	.....
Pig iron ^r .....	.....	3,823	6,361	52,324	.....
All rolled steel ^r .....	.....	12,761	29,031	147,273	.....
British Production: (gross tons)					
Pig iron ^s .....	.....	661,000	696,300	3,311,700	.....
Steel ingots ^s .....	.....	938,000	1,047,300	5,232,000	.....

^a Three months' average. [†] 000 omitted.
 Source of data: ^a American Iron and Steel Institute; ^b THE IRON AGE; ^c Bureau of Mines; ^d Lake Superior Iron Ore Association; ^e Bureau of the Census; ^f American Institute of Steel Construction; ^g United States Steel Corp.; ^h Preliminary figures from Automobile Manufacturers Association—Final figures from Bureau of the Census, U. S. and Canada; ⁱ F. W. Dodge Corp.—37 Eastern states; ^k Railway Age; ^l National Machine Tool Builders Association; ^m Foundry Equipment Manufacturers Association; ⁿ Department of Commerce; ^s British Iron and Steel Federation.

Weekly Booking of Construction Steel

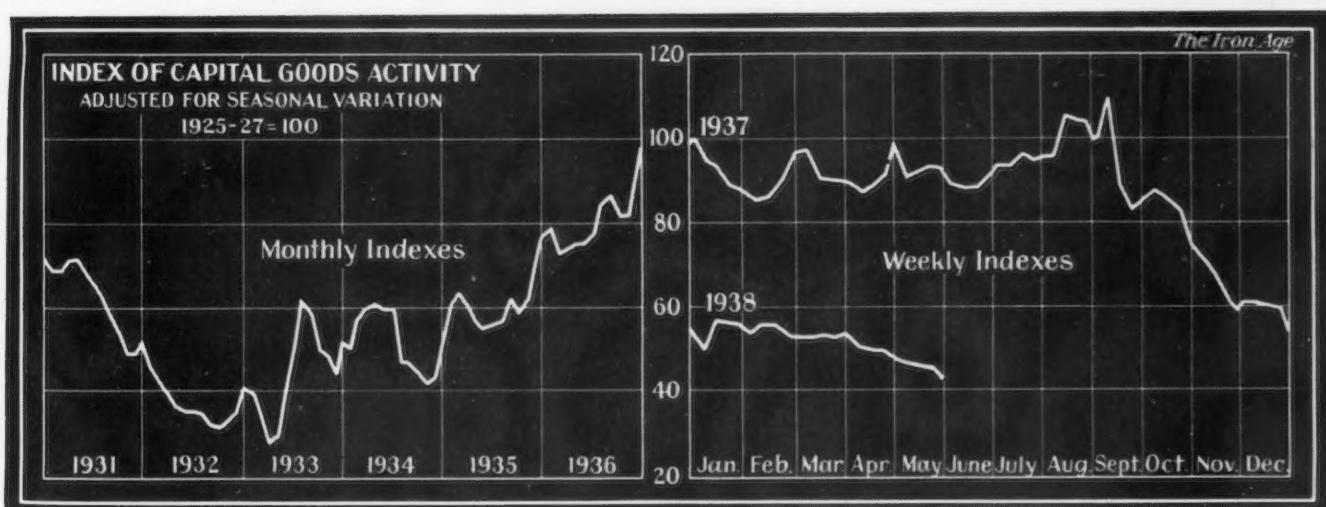
	Week Ended				Year to Date	
	June 7, 1938	June 1, 1938	May 10, 1938	June 8, 1937	1938	1937
Fabricated structural steel awards	18,750	6,525	14,950	24,650	297,445	554,565
Fabricated plate awards	3,975	3,010	2,820	0	61,270	72,185
Steel sheet piling awards	800	900	0	9,400	15,825	26,270
Reinforcing bar awards	2,660	2,050	5,910	7,300	95,350	99,235
Total Lettings of Construction Steel... .	26,185	12,485	23,680	41,350	469,900	752,255

25 Per Cent Steel Ingot Output Rate Holds



District Ingot Production, Per Cent of Capacity	CURRENT WEEK												PREVIOUS WEEK												Aggregate 25.0		
	Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Wheeling	Buffalo	Detroit	Southern	S. Ohio River	Western	St. Louis	Eastern	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0			
18.0	23.0	22.0	22.0	22.0	24.0	42.0	21.5	19.5	52.0	24.0	30.0	42.0	10.0	18.0	23.0	19.0	21.0	24.0	47.0	21.5	19.5	52.0	40.0	30.0	42.0	10.0	25.0

Sagging Automobile Production Lowers Index 2.8 Points



A SHARP decline in automobile assemblies in the holiday week of June 4 forced the index of capital goods activity down 2.8 points to 43 per cent of the base years, establishing a new low for the present recession. In computing the index the short week was taken into consideration. Steel ingot production and activity in Pittsburgh were also lower in the week, while heavy construction activity remained unchanged and lumber carloadings gained slightly against the seasonal trend. The average index for May was 46.3 against 50.7 in April and 93.0 in May, 1937. The May average is the lowest since November, 1934, when the average was 42.3.

	Week Ended June 4	Week Ended May 28	Comparable Week	
			1937	1929
Steel ingot production ¹ ...	32.1	35.1	102.1	135.7
Automobile production ² ...	28.6	39.2	92.0	127.9
Construction contracts ³ ...	61.1	61.1	58.0	128.0
Forest products carloadings ⁴ ...	47.7	45.9	84.3	113.6
Production and shipments, Pittsburgh district ⁵ ...	45.3	47.7	108.6	127.7
Combined index	43.0	45.8	89.0	126.6

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. Engineering News-Record; 4. Association of American Railroads; 5. University of Pittsburgh.

....SUMMARY OF THE WEEK....

...Steel business continues to decline in volume.

• • •

...Shipbuilding tonnage the most important early prospect.

• • •

...Pig iron output 11.7 per cent lower in May.

STEEL business continues to decline in total volume, the first week of this month having dropped below the May average, which, in turn, was lower than that of April.

Ingot production remains at last week's rate of 25 per cent of capacity, which is in reality a reduction because some mills operated only five days last week against six days scheduled for this week. Tin plate, one item that is usually pointing upward at this time of year, is in a contraseasonal decline, operations having dropped to a range of 40 to 45 per cent.

The only important steel tonnage in early prospect is from shipbuilders, who have about 100,000 tons to place for contracts recently closed. The Maritime Commission last week awarded four cargo ships to the Newport News Shipbuilding & Dry Dock Co., which also has a contract for a passenger liner. Steel is also to be bought for 12 cargo ships previously awarded, four each to Federal Shipbuilding, Sun Shipbuilding and Tampa Shipbuilding companies.

Public construction activities promise to take increasing amounts of steel as Government-financed projects come into the market. Bids have been taken on the Shasta dam in California, for which 70,000 to 75,000 tons of steel will be required, including relocation of railroad tracks. The Chicago subway project, requiring about 30,000 tons of steel, will probably be built if Government funds are provided. Many other jobs of similar nature are likely to come into the market during the summer months, though it is doubtful whether much steel will be rolled before the fall owing to the time required for the taking of bids and other preliminaries.

Meanwhile, structural steel projects awarded within the past week jumped to nearly 19,000 tons compared with about 6500 tons in the previous week. The largest letting was 8800 tons for the Government printing office in Washington, other sizable projects being 2425 tons for bridges in California for the Union Pacific Railroad and 1500

tons for TVA transmission towers in Alabama. Work out for bids totals nearly 17,000 tons, including 6000 tons for a bridge at Redding, Cal., for the Bureau of Reclamation, 2480 tons for bridges in Oklahoma, 1100 tons for a transit shed at Bayonne, N. J., and 1000 tons for a new wire mill building for the Wickwire-Spencer Steel Co. at Tonawanda, N. Y. An office building for the Metropolitan Life Insurance Co. in New York, requiring 12,000 tons, is expected in the market shortly.

Whatever activity there is during the summer will probably emanate largely from Government spending and lending. The automobile industry is not likely to make any important purchases before August, when preparations for 1939 models will be fully under way, though meanwhile the truck branch of the industry is expecting a good demand from farm areas resulting from large crop movements. Prospects of railroad loan legislation before adjournment of Congress are dimmed by the opposition of railroad workers to wage-reductions.

PIG iron production in May declined to 1,255,024 gross tons from 1,376,141 tons in April, a loss of 11.7 per cent when figured on the daily rate of 40,485 tons against 45,871 tons in the preceding month. On June 1 there were 72 furnaces in blast, a loss of seven during the month. Further contraction of output is indicated for this month.

Steel ingot production in May, totaling 1,806,805 gross tons, represented an average operation of 30.39 per cent. In April, last year, the industry made more steel in a week than it made all last month. The five-months' total this year is 9,180,867 tons, which points to a half-year production of less than 11,000,000 tons.

Canada presents a unique contrast to the situation in the United States. Aided by British contracts for airplanes and ordnance, the Canadian steel industry is operating at practically full capacity, while 65 per cent of its pig iron capacity is active. New industrial plants are being built and demand for machine tools, some of which has been directed to American manufacturers, is rapidly expanding.

AMERICAN scrap exporters have booked orders from Europe, mainly Italy and Germany, totaling a few hundred thousand tons at low prices—\$9.75 and \$10, f.a.s. for No. 1 heavy melting steel and \$8.25 and \$8.50 for the No. 2 grade. No. 1 steel scrap has declined 50c. a ton at Chicago, bringing THE IRON AGE scrap composite price down to \$11, the lowest since July, 1935.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	June 7,	June 1,	May 10,	June 8,
	1938	1938	1938	1937
Rails, heavy, at mill	\$42.50	\$42.50	\$42.50	\$42.50
Light rails, Pittsburgh	43.00	43.00	43.00	43.00
Rerolling billets, Pittsburgh	37.00	37.00	37.00	37.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	37.00
Slabs Pittsburgh	37.00	37.00	37.00	37.00
Forging billets, P'gh	43.00	43.00	43.00	43.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	47.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	2.10	2.10	2.10	2.10

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	2.45
Bars, Chicago	2.50	2.50	2.50	2.50
Bars, Cleveland	2.50	2.50	2.50	2.50
Bars, New York	2.81	2.81	2.81	2.78
Plates, Pittsburgh	2.25	2.25	2.25	2.25
Plates, Chicago	2.30	2.30	2.30	2.30
Plates, New York	2.55	2.55	2.55	2.53
Structural shapes, P'gh ..	2.25	2.25	2.25	2.25
Structural shapes, Chicago ..	2.30	2.30	2.30	2.30
Structural shapes, New York ..	2.52	2.52	2.52	2.525
Cold-finished bars, P'gh ..	2.90	2.90	2.90	2.90
Hot-rolled strips, P'gh ..	2.30	2.30	2.40	2.40
Cold-rolled strips, P'gh ..	3.10	3.10	3.15	3.20
Sheets, galv., No. 24, P'gh..	3.80	3.80	3.80	3.80
Sheets, galv., No. 24, Gary..	3.90	3.90	3.90	3.90
Hot-rolled sheets, P'gh ..	2.30	2.30	...	...
Hot-rolled sheets, Gary ..	2.40	2.40	...	...
Cold-rolled sheets, P'gh ..	3.35	3.35	...	...
Cold-rolled sheets, Gary ..	3.45	3.45	...	...
Wire nails, Pittsburgh ..	2.75	2.75	2.75	2.75
Wire nails, Chicago dist. mill	2.80	2.80	2.80	2.80
Plain wire, Pittsburgh ..	2.90	2.90	2.90	2.90
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.95
Barbed wire, galv., P'gh ..	3.40	3.40	3.40	3.40
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	3.45
Tin plate, 100 lb. box, P'gh ..	\$5.35	\$5.35	\$5.35	\$5.35

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

<i>Per Gross Ton:</i>	June 7, 1938	June 1, 1938	May 10, 1938	June 8, 1937
No. 2 fdy., Philadelphia	\$25.84	\$25.84	\$25.84	\$25.76
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cinti	23.89	23.89	23.89	23.69
No. 2, Birmingham ⁷	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago ⁸	24.00	24.00	24.00	24.00
Basic, fd'd eastern Pa.	25.34	25.34	25.34	25.26
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago ⁹	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.04
Ferromanganese, seab'd car-lots		102.50	102.50	102.50

⁴ This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.

* The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

<i>Per Gross Ton:</i>					
Heavy melting steel, P'gh.	\$10.75	\$10.75	\$11.75	\$18.75	
Heavy melting steel, Phila.	12.00	12.00	12.25	17.75	
Heavy melting steel, Ch'go.	10.25	10.75	11.25	15.75	
Carwheels, Chicago	12.00	12.50	13.00	18.25	
Carwheels, Philadelphia	14.75	14.75	14.75	19.75	
No. 1 cast, Pittsburgh	13.25	13.25	14.25	19.25	
No. 1 cast, Philadelphia	14.25	14.25	14.75	20.25	
No. 1 cast, Ch'go (net ton)	10.25	10.75	10.75	15.25	
No. 1 RR. wrot., Phila.	15.25	15.25	15.25	19.75	
No. 1 RR. wrot., Ch'go (net)	7.75	8.25	8.75	15.00	

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	\$4.00	\$4.00	\$4.00	\$4.60
Foundry coke, prompt	5.00	5.00	5.00	5.25

Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	9.00	9.00	10.00	14.00
Lake copper, New York	9.125	9.125	10.125	14.12 $\frac{1}{2}$
Tin (Straits), New York	38.75	37.50	38.00	56.00
Zinc, East St. Louis	4.00	4.00	4.00	6.75
Zinc, New York	4.39	4.39	4.39	7.10
Lead, St. Louis	3.85	3.85	4.35	5.85
Lead, New York	4.00	4.00	4.50	6.00
Antimony (Asiatic), N. Y.	13.75	13.75	14.75	14.75

The Iron Age Composite Prices

Finished Steel

	Finished Steel
June 7, 1938	2.487c. a Lb.
One week ago	2.487c.
One month ago	2.512c.
One year ago	2.512c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Pig Iron

\$23.25 a Gross Ton
23.25
23.25
23.25

Based on average basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Steel Scrap

11.00 a Gross Ton
11.17
11.75
17.42

Based on No. 1 heavy melting
steel quotations at Pittsburgh,
Philadelphia and Chicago.

United States Output				Non at Cincinnati			
High	Low	High	Low	High	Low	High	Low
1938	2.512c, Mar. 9 ; 2.249c, Mar. 2	\$23.25, Mar. 9 ; \$20.25, Feb. 16	\$14.00, Jan. 4 ; \$11.00, June 7				
1937	2.249c, Dec. 28 ; 2.016c, Mar. 10	19.73, Nov. 24 ; 18.73, Aug. 11	21.92, Mar. 30 ; 12.92, Nov. 16				
1936	2.062c, Oct. 1 ; 2.056c, Jan. 8	18.84, Nov. 5 ; 17.83, May 14	17.75, Dec. 21 ; 12.67, June 9				
1935	2.118c, Apr. 24 ; 1.945c, Jan. 2	17.90, May 1 ; 16.90, Jan. 27	13.42, Dec. 10 ; 10.33, Apr. 23				
1934	1.953c, Oct. 3 ; 1.811c, Apr. 18	16.90, Dec. 5 ; 13.56, Jan. 3	13.00, Mar. 13 ; 9.50, Sept. 25				
1933	1.915c, Sept. 6 ; 1.877c, Jan. 12	14.81, Jan. 5 ; 13.56, Dec. 6	12.25, Aug. 8 ; 6.75, Jan. 3				
1932	1.981c, Jan. 13 ; 1.883c, Dec. 29	15.90, Jan. 6 ; 14.79, Dec. 15	8.50, Jan. 12 ; 6.43, July 5				
1931	2.192c, Jan. 7 ; 1.962c, Dec. 9	18.21, Jan. 7 ; 15.90, Dec. 16	11.33, Jan. 6 ; 8.50, Dec. 29				
1930	2.223c, Apr. 2 ; 2.192c, Oct. 29	18.71, May 14 ; 18.21, Dec. 17	15.00, Feb. 18 ; 11.25, Dec. 9				
1929	2.192c, Dec. 11 ; 2.142c, July 10	18.59, Nov. 27 ; 17.04, July 24	17.58, Jan. 29 ; 14.08, Dec. 3				
1928	2.402c, Jan. 4 ; 2.212c, Nov. 1	19.71, Jan. 4 ; 17.54, Nov. 1	16.50, Dec. 31 ; 13.08, July 2				
1927			15.25, Jan. 17 ; 13.08, Nov. 22				

...PITTSBURGH...

...District ingot output holding at 18%, but Wheeling-Weirton area has further decline... Tin plate production down contra-seasonally... Shipbuilding tonnage best early prospect.

PITTSBURGH, June 7.—Pittsburgh district ingot production is practically unchanged this week at 18 per cent, while the Wheeling-Weirton district has declined five points to 42 per cent. Some steel plants are still liquidating accumulations of raw steel.

Incoming steel business in the past week was a shade less in volume than the week before. Most producers look for no important change in demand in the immediate future, although structural plate and shape tonnages may increase this month owing to specifications involving shipbuilding and Southern Railway freight car tonnage.

Tin plate operations are off contraseasonally, being estimated at 40 to 45 per cent. Most can makers are buying sparingly, taking only absolute requirements.

The confused situation in secondary merchant wire prices may bring an early clarification.

The announcement on galvanized sheets is expected momentarily and will probably name a lower base price.

Pig Iron

New business continues to lag and there appears to be little chance for improvement in the near future. Although consumer stocks are low, inventories have increased at some producers' plants.

Semi-Finished Steel

Reflecting irregular and spotty demand rather than actual improvement, semi-finished orders increased in volume during the past week.

Bars, Plates and Shapes

Bar sales slipped off further during the past week and no important change in trend is expected in the near future. Structural plate and shape inquiries were about on a par with a week ago but tonnages involved are exceptionally small. Awards were unimpressive. In view of shipbuilding tonnages and

requirements for Southern Railway freight cars, structural business in June is expected to be as good as, if not better than, May bookings.

Reinforcing Bars

Inquiries and awards reflected a small improvement from a week ago but tonnages were not large. A fair number of reinforcing bar projects are still pending.

Tin Plate

Tin plate operations this week have leveled off a few points and are estimated at 40 to 45 per cent. This movement is contraseasonal. General line can specifications are being influenced by general business conditions

while all tin plate consumers are restricting purchases to absolute necessities.

Wire

Aggregate wire bookings are equally as good as a week ago. With the merchant wire price situation still confused in some areas, early clarification may be forthcoming.

Tubular Goods

Demand for tubular goods is no better than a week ago. Buyers continue to purchase only absolute necessities. The somewhat optimistic view held for oil-country goods sales a few months ago has been dispelled by subsequent business conditions.

Sheets and Strip

Sheet demand improved slightly during the past week but from a tonnage standpoint was unimpressive. Some automobile makers have made clean-up purchases for 1938 models.

The long awaited price announcement on galvanized sheets is looked for this week and is expected to disclose a lower basing point.

...ST. LOUIS...

...Railroads not spending all money authorized by court.

ST. LOUIS, June 7.—All the expenditures authorized by the Federal Court here for three railroads have not been made, the lines withholding further commitments until their receipts justify expenditures. Reports from the Southwest territory served by these lines are that there is a bumper wheat crop to handle, and steel mills are hopeful that the freight receipts of this movement will enable the railroads to go ahead with all expenditures authorized by the Court.

The State of Oklahoma will open bids on June 21 for six highway bridges totaling 2480 tons of structural shapes, the largest of which, at Bixby, is for 1584 tons. Structural fabricators report that business is extremely dull.

Mills are analyzing closely each order received for sheets because of the recent revision of charges for extras for third quarter. If, as in some

cases, the price is lower under the present scale, commitments are being made now; otherwise, consumers are withholding orders. Orders that are placed are still on a hand-to-mouth basis.

The melt of pig iron in the St. Louis area shows some improvement, principally as a result of greater activity by the stove foundries. In the Quincy, Ill., sector the plants have started operations on a five-day basis in preparation for deliveries to be made in August. There also is an improvement in the Belleville district. Buying is light and for immediate needs.

Anti-CIO Union "Dead" But Labor Board "Takes Steps"

LABOR BOARD members sought this week to force an inactive anti-CIO union to "stay dead" by ordering the Yates-American Machine Co., Beloit, Wis., to refuse to recognize the Yates-American Employees Association "if it is at any time revived." Simultaneously the board dismissed a charge that an employee had been dismissed due to his SWOC membership.

... . CHICAGO . . .

... Ingot production unchanged but volume of business is declining . . . Steel scrap declines 50c a ton . . . Only 11 blast furnaces now operating in district.

CHICAGO, June 7.—An increase in production at one mill and losses at two other plants result this week in an unchanged rate of ingot output of 23 per cent of capacity. Two blast furnaces were blown out last month, only 11 stacks now operating in this district.

May sales and specifications in most offices were worse than in April and few are hopeful of an improvement in June. Business thus far this month already is showing a downward trend. No change has yet been seen in the now general practice of buying only for current requirements. Inventories slowly are being reduced, and it is estimated that stocks on hand in most plants would be insufficient for 30 days' operations under normal conditions.

The new pricing setup on sheets and strip has had no apparent effect on sales of these products and neither has reaffirmation of quotations on other products been a factor in bettering conditions.

The strike at the J. I. Case Co. plant at Rockford, Ill., was ended last week when a Federal conciliator arranged for conferences between management and employee representatives, work to proceed meanwhile.

Little buying is expected from the railroads during the summer. Strike possibilities because of the suggested wage reduction are considered remote at present, because of the many conferences which must precede such action. Some vague feelers for cars have been reported but nothing definite is known. The Southern Railway car orders, though placed, have not yet been released, pending solution of financing problems.

Scrap prices are down 50c. a ton, No. 1 being quoted at \$10 to \$10.50. Prices are mostly nominal in the absence of mill buying.

Pig Iron

Only 11 furnaces are now in blast in this district, two less than during May and most of these are on curtailed schedules. Shipments and spot

sales over the summer months are not expected to increase noticeably, but iron sellers along with steel salesmen are looking hopefully toward autumn.

Wire and Wire Products

Industrial sales in this area are poor and the demand for merchant products is tapering off some, with the end for the spring buying season being predicted for the last of this month. Manufacturing consumers invariably are following the policy of buying for immediate needs only, even though inventories in many plants are known to be quite low.

Warehouse Business

Weighted averages show no important changes in the trend since the first of the year. May and April were almost on a par and thus far in June business is about even with the last

two weeks of May. Wide diversification of orders is reported and all products are in equal demand.

Bars, Plates and Shapes

Jobbers and farm equipment plants are the most active bar consumers but specifications from the latter are declining. Reinforcing bar orders are light, jobs involving more than 100 tons being scarce. Prices still are bad and the effort on the part of Missouri mills to stabilize the market to some extent is not regarded hopefully. Publicly financed projects dominate the shape market. The largest award last week was 880 tons to Bethlehem. Tank building activity, especially in the larger sizes, is fairly steady but railroad purchasing is unimproved and the summer holds no hopes for a revival of this business.

Sheets and Strip

Current sales are no better, delivery being offered in three weeks or less on any type sheet. No stimulus whatever to buying was afforded by the revised base extras on sheets and strip. The trade is anxiously awaiting the galvanized sheet price, this grade sheet usually being in fair demand from miscellaneous sources and building contractors.

CAST IRON PIPE..

Centerville-Osterville, Mass., Fire District will install 19 miles of 6 to 12-in. pipe, 160 hydrants, pumping station equipment, etc., at a time to be announced later. Whitman & Howard, 89 Broad Street, Boston, engineers, have plans in progress. C. H. Brown, Osterville, Mass., is chairman of committee.

Corsicana, Tex., is considering new main pipe line from Corsicana Lake, source of water supply, to city limits. Cost about \$100,000. Financing will be arranged through Federal aid.

Carrollton, Mo., plans extensions in water pipe lines and other municipal waterworks installation. Cost about \$165,000. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Quindaro Township, Wyandotte County, Kan., near Kansas City, Kan., has let contract to National Cast Iron Pipe Co. for 1985 tons of 2, 4 and 8-in. pipe at \$139,049, for extensions in water system. Project will include a 100,000-gal. elevated steel tank and tower, and other waterworks installation. Charles A. Haskins & Co., Finance Building, Kansas City, Mo., are consulting engineers.

Wadesboro, N. C., has voted bond issue of \$150,000 for pipe line extensions and improvements in water system, and other waterworks installation.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 21 for cast iron soil pipe for Eastern yards and Mare Island, Cal., Navy Yard (Schedule 3618).

Toledo, Ohio, plans 78-in. main pipe line from new water intake on Lake Erie to new filter plant, about 12 miles, and other trunk mains from latter place to connection with present city supply line; also new distributing lines in different parts of city. Project will include 12,000-ft. intake tunnel in Lake Erie, filter plant with daily capacity of 64,000,000 gal., two large pumping stations and other waterworks structures. Cost \$8,200,000. Financing is being arranged through Federal aid.

Olmstead, Ill., plans pipe lines for water system and other waterworks installation, including elevated steel tank and tower and pumping equipment. Cost close to \$40,000. Financing is being arranged through Federal aid. Russell & Axon, 4903 Delmar Boulevard, St. Louis, are consulting engineers.

Supervising Construction Engineer, Indian Service, Billings, Mont., closes bids June 13 for 1670 lin. ft. of cast iron water pipe, pipe fittings, valves, hydrants, etc., for Rapid City, S. D.

Alhambra, Cal., plans 6-in. pipe to replace old 6-in. steel pipe lines in parts of Valencia, Fifth and Cedar Streets (Resolutions of Intentions Nos. 6161, 6162 and 6163).

Bend, Ore., plans pipe line extensions and improvements in water system. Cost about \$38,000. Financing is being arranged through Federal aid.

Mansfield, Ohio, has taken bids on 630 tons of water pipe. United States Cast Iron Pipe & Foundry Co. is low bidder.

Cuyahoga Falls, Ohio, has taken bids on 555 tons of water pipe. J. B. Clow & Sons, Cleveland, are low bidders.

..BIRMINGHAM..

... Open-hearth production up slightly . . . Business sluggish.

BIRMINGHAM, June 7.—The iron and steel markets are unchanged. New steel business consists of scattered orders for miscellaneous products, with the tonnages mainly small. Pig iron buying and shipments are sluggish.

Last week open hearth production was stepped up one unit, to 13, and that schedule will be followed again this week. The increase is at Fairfield.

Republic Steel Corp. resumed production of pig iron on Sunday, June 5, with No. 2 furnace, which had been banked on May 22. This increases the district's active total to seven.

Unless some last minute tonnage ar-

rives, the Ensley rail mill will probably be closed during the week.

The U. S. Housing Authority has released \$3,828,000 for a housing project in Birmingham.

Homer Martin's Pay \$4755 for Six Months

TOTAL expenses of the United Automobile Workers Union for 1937 were \$1,587,561 and receipts were \$1,770,450, according to the semi-annual report and audit supplied to UAW locals by International headquarters. The union's treasury balance on Dec. 31, 1937, was \$182,889 as compared with \$428,779 on June 30, 1937.

Per capital taxes paid into the international treasury during the last six months of the year totaled \$565,002 which has been interpreted to indicate an approximate paying membership of 269,000, although this does

not account for non-paying unemployed members and is complicated further by the fact that there was a rush of per capita payments for representation at the international convention last fall.

Major expenditures during the last six months included: Per capita payments to the national CIO, \$82,513; Ford organizing drive, \$73,904; salaries of officers, organizers and office employees, \$231,009; expenses of officers, organizers and office employees, \$144,102; UAW newspaper, \$77,955; donations to strikes, \$42,494.

Salary of Homer Martin, president, was indicated as \$1,961, and \$2,794 expenses during the six months. Vice-presidents were paid salaries and expenses as follows: Richard T. Frankensteen, \$1,739 and \$1,482; Wyndham Mortimer, \$1,827 and \$2,475; Ed Hall, \$1,846 and \$1,683; Walter N. Wells, \$1,904 and \$1,546; R. J. Thomas, \$1,230 and \$552.

SO far as material progress is concerned, the story of "Creation" could begin with this illustration. For out of this furnace will flow not merely steel but machines, skyscrapers, railroad trains and tens of thousands of other tools and conveniences.

• • •



... CLEVELAND ...

... New business in steel declining . . . Operating rates continue to fluctuate . . . Price announcement awaited on galvanized sheets, which are weak . . . 1000 tons of structural required for Wickwire-Spencer wire mill.

CLEVELAND, June 7.—New business for steel producers is sliding off slowly toward a low level for the year. Public construction is active, but other bright spots in buying are becoming difficult to find. As has been the case all this year, steel consumption in the South is stronger than elsewhere in the nation.

Ingot operations of certain individual producers have not presented an entirely accurate picture recently, the declines in some cases being sharper than the shrinkage of new business. With rollings intermittent, operating problems have increased and consumers desirous of fast delivery on small orders, who ordinarily rely upon one or two mills, have found it advisable to keep posted on the schedules of outside producers.

Resale prices show marked weaknesses. Especially has this been true in galvanized sheets, on which mill announcement of a new price setup is overdue. The sheet and strip changes which came out a few weeks ago have been well received, generally speaking.

The ingot rate for Youngstown and nearby cities this week is up three points to 22 per cent; for Cleveland-Lorain down two points to 22 per cent.

Pig Iron

Shipments and orders are slackening, indicating that June, as generally expected, will be slower than May. Many foundries in the Middle West, particularly those supplying the automotive industry, are down to very light operations. Activity in the South is better sustained, but sizable inventories are prevalent. Producers report the reaction has been favorable from most consumers toward the recent reaffirmation of present prices for third quarter.

Iron Ore

Iron ore shipments from upper Lake ports in May totaled 1,180,703 gross tons, compared with 10,043,856 tons in May, 1937. Total for the 1938 season

to June 1 was 1,441,217 gross tons against 13,814,411 tons to the same date last year.

Sheets and Strip

With the new sheet and strip cards becoming more widely understood, comment from most consumers has been favorable. However, manufacturers of enamel ware indicate they will buy in multiple lengths to obtain quantity deductions and to avoid length extras. So far this is the principal indicated change in buying habits. The scheduled higher net prices on lighter gage materials have been gratifying to the smaller producers. Whether users of light gage material will do any stocking before July 1 remains to be seen. While the announcement on galvanized sheets is awaited, prices in the secondary market have been becoming weaker.

Wire and Wire Products

Demand for merchant wire products continues to hold up fairly well in a few sections of the nation, although in the aggregate the buying trend is downward. Prices for manufacturers' wire, rods and other wire products are firm. Resale prices of merchant wire products continue erratic. In the eight states where trucking is more prevalent than elsewhere, a new allowance plan for motor freight is in effect.

Bars, Plates and Shapes

Around 1000 tons of fabricated structural steel will be required for a new Wickwire-Spencer mill building at Tonawanda, N. Y., one of the largest recent private projects in the Great Lakes district. Bids are being received this week. Several small private jobs are nearly ready to be awarded. Carnegie-Illinois Steel Corp. has been awarded 800 tons of bearing piles for the river piers of the Main Street bridge, Cleveland. Republic Structural Iron Works, Cleveland, has been awarded 235 tons of reinforcing bars for the land piers, and Union Metal Mfg. Co., Canton, Ohio, the fluted steel shells for the

same piers. Wooster, Ohio, will take bids June 14 on a project requiring 130 tons of reinforcing bars.

Tubular Goods

Specifications for standard pipe have shown improvement during the past month. Casing requirements from the oil country are only fair. Pipe line activity is hampered in several cases by difficulty in arranging financing. Bethlehem Steel Co. has been awarded 1766 tons of steel pipe by the City of Cleveland.

CANADA

... Business becoming more active . . . Nearly all steel capacity engaged.

TORONTO, June 7.—Industrial concerns in Canada are getting ready for extended operations on contracts recently closed and several new plants are to be erected or are in process of erection. Demand for machinery and machine tools is increasing and some good inquiries have been sent out, while others for airplane plants and for replacements in a large number of factories are pending.

Structural steel and reinforcing demand is sustained and while current orders are running only up to 500 tons a few orders involving lots of 1000 to 3000 tons are in prospect. The Bank of Montreal has purchased the property at Bay and King Streets, Toronto, where a head office building will be erected at a cost of approximately \$2,000,000 for which some 3000 tons of steel will be required.

Steel mills are running practically at capacity, while the foundry rate is said to be around 70 per cent, and interests associated with the steel industry look for a good year from the standpoint of production and earnings.

Merchant pig iron sales are steady but lacking in special feature. Melters are taking iron as demands dictate and awards are being made regularly in lots of 50 to 500 tons. Inquiries are appearing for third quarter and local blast furnace representatives look for increased booking covering the coming three months. While some water deliveries have been made, it is stated that shipments in this way have not got into full swing. Production of pig iron is steady and running about 65 per cent of all Canadian blast furnace capacity.

REINFORCING STEEL

*...Awards of 2660 tons;
4840 tons in new projects.*

AWARDS

654 Tons, Chicago, Soldier's Field, to Joseph T. Ryerson & Son, Inc., Chicago.
400 Tons, Nassau County, N. Y., mesh, Wantagh Parkway extension, to American Steel & Wire Co., New York.
250 Tons, Jarrett, Va., Johns-Manville Corp. plant, to Rosslyn Steel & Cement Co., Washington.

235 Tons, Cleveland, land piers for Main Street bridge, to Republic Structural Iron Works, Cleveland, through A. J. Forschner Co., Chicago.

200 Tons, Calexico, Cal., All-American Canal (Invitation 42070-A), to Bethlehem Steel Co., San Francisco.

190 Tons, Erie County, N. Y., mesh, highway project, to American Steel & Wire Co., New York.

160 Tons, Keokuk, Iowa, waterworks and elevated tanks, to Sheffield Steel Corp.

150 Tons, Chicago, underpass, South Laramie Avenue, to Calumet Steel Co., Chicago.

120 Tons, Marshall County, Ill., bridge, route 90, section 1-D, to Bethlehem Steel Co., Bethlehem, Pa.

100 Tons, Allegany County, N. Y., mesh, highway project, to American Steel & Wire Co., New York.

100 Tons, Petoskey, Mich., Traverse Hospital, to Pollak Steel Co., Cincinnati.

100 Tons, Jefferson County, Mo., State prison, power house, to Sheffield Steel Corp., Kansas City, Mo.

NEW REINFORCING BAR PROJECTS

1000 Tons, Hoboken, N. J., General Foods building.

800 Tons, State of Illinois, paving: bids in; 500 tons of wire mesh.

525 Tons, Chicago, merchandising buildings.

550 Tons, Minneapolis, Four Square building, Minnesota State Fair.

300 Tons, New York, mesh and bars, Needle Trades School.

287 Tons, Everett, Mass., Beacon Oil Co., concrete tank.

250 Tons, Pittsburg, N. H., State dam.

200 Tons, Auburn, Me., State road.

190 Tons, Eldridge, Cal., detention cottages; Carl N. Swenson Co., San Jose, low bidder on general contract.

130 Tons, Wooster, Ohio, sewerage treatment plant; bids due June 14.

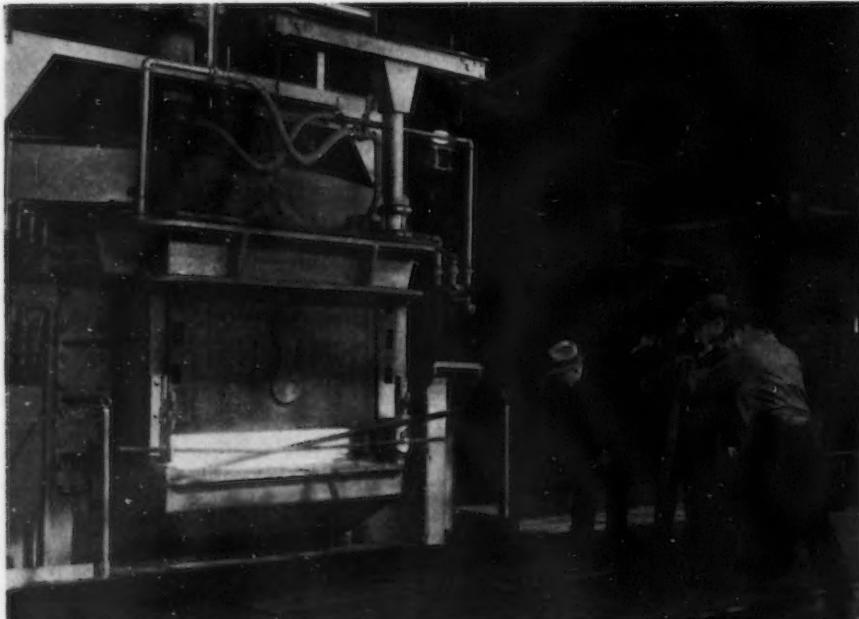
104 Tons, Glendive, Mont., Bureau of Reclamation (Invitation 28064-A); bids opened.

100 Tons, Portland, Me., State bridge.

100 Tons, Fort Mitchell, Ky., new Catholic church.

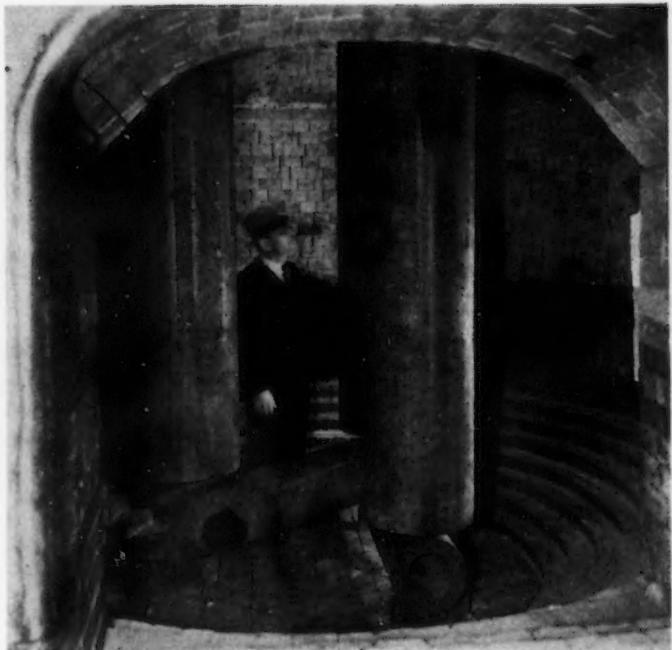
100 Tons, Indianapolis, Link Belt Co. power house.

100 Tons, Detroit, Carboloy building.



The Cameraman Looks Into a New 25-Ton Electric Furnace

ABOVE is pictured an important event in the alloy and tool steel divisions of the Bethlehem Steel Co.'s Bethlehem Plant; the burning in of the bottom in a new 25-ton electric arc furnace. Its three 18-foot graphite electrodes (see interior view of the furnace at right) are made up of 6-foot sections screwed together. It will be employed in making alloy and special carbon steels.



.. PHILADELPHIA ..

... District operations down to 22 per cent . . . Ship tonnage only current outlet of moment . . . Warehouse stocks down to normal level . . . Scrap prices steady; pig iron inactive but firm.

PHILADELPHIA, June 7.—District mill offices report erratic bookings of a miscellaneous nature, with daily tonnage spurring occasionally and then dropping off to almost complete inactivity. The total ordering to date in June has run, say, 5 to 10 per cent under the average May level, and this decline has been reflected definitely in mill rolling schedules. No seller here can bring forth one valid reason for expecting anything other than indifferent business over the next two months, but even apart from wishful thinking there is a growing belief that late August will witness some automobile buying for new models, some railroad purchases for absolutely needed repairs, and a revival of miscellaneous buying as stocks reach the vanishing point, all of which combined will give operating rates a fillip toward higher brackets.

Bethlehem operations have eased somewhat, Worth continues to refine steel in two open hearths even though stocking some ingots, Phoenix has all furnaces down for the week, and Alan Wood's and Lukens' furnaces are just about meeting rolling demands. The aggregate district rate is in the neighborhood of 22 per cent, with further drops of any size hardly likely in the near future.

Miscellaneous tank and boiler shops are taking the bulk of current light plate production here, railroad demands are so small as to be picayune, and the only bright spots in the future picture are the steel requirements for 12 Maritime C-2 freighters which will be released by Federal, Sun and Newport News shipyards sometime within the next six weeks. Warehouse stocks have been freed of all surplus, but current normal lists will be able to take care of demands, estimated at about 45 per cent of normal, for some weeks to come. Philco, a large buyer of sheets, will soon come out with 1939 radio models, but, with its own stamping plant down with labor

difficulties, much of this work will be farmed out to stamping plants, many of which buy steel outside of this district.

Newly announced prices on most steel products are apparently steady here, albeit untested, and the trade is only mildly curious as to what the new set-up will be on galvanized sheets. None of the weakness on certain grades, which has come to the fore in the West, has made its appearance in this area, but resale prices

on pipe seem to grow progressively worse, prices on nails fluctuate from bad to fair and back again, bolts and nuts are very weak, and fabricated plates, shapes and bars are all going at quotations admitting little or no profit.

The most attractive shapes award in this district for many a month, the Washington Printing Office requiring 8800 tons, has gone to Bethlehem through McCloskey & Co., general contractor. The 2300 tons of rail steel bars for this same job has not yet been placed. Bethlehem also has secured 185 tons of shapes for alterations to an Ebensburg, Pa., grand stand. Tonnages being figured by estimators here are mostly small and scattered, the only one of size being the Hahnemann Hospital, involving 565 tons, which should be placed before the week's end.

Imports

During the past week an importation of 8818 tons of manganese ore was received here.

... BOSTON ...

... New England foundry trade more hopeful.

BOSTON, June 7.—Larger pig iron sales, noted a week ago, proved to be a flash in the pan. Current business is confined to an occasional carlot of Mystic, Buffalo and Indian iron. However, sentiment among foundrymen is more hopeful than in many other lines of business. Stove manufacturers, in the doldrums this spring, are doing a little better; here and there other foundries are securing enough business to maintain a three day a week operating schedule; and quite a few have increased charges per melt. Based on stocks of iron in jobbing foundry yards, and the outlook for casting orders, pig iron should move more freely than before the close of June.

There continue to be encouraging straws in general New England business, yet the average producer of goods is doing even less than in 1933.

While prices for steel mill products generally are holding, those for reinforcing steel are quite unsettled, there apparently being no price basis at the moment.

.. SAN FRANCISCO ..

... Shasta Dam bids taken; business generally is dull.

SAN FRANCISCO. — Attention during one of the quietest market weeks of the year was centered on the opening of bids for Shasta Dam, main unit of the California Central Valley project, and designed to be the second largest concrete dam in the world. Low bidders by a nose, Pacific Constructors, Inc., a syndicate with offices at Los Angeles, offered to build the structure for \$35,939,450.

Uncertainty still prevails over the third quarter price structure here on sheets and strip. Columbia Steel Co. has announced prices to its customers in line with Carnegie-Illinois figures on most items, but effecting a greater reduction in some instances. No new Coast prices are being quoted by Bethlehem, and Republic is referring price inquiries to the East. Some quarters believe that now is the logical time to take increased freight rates into account on a revised price structure.

Continuation of construction work by the Air Corps in the Hawaiian Islands offers the brightest immediate structural steel prospect.

...NEW YORK...

...Orders taken for galvanized sheets at 3.60c., Pittsburgh, but price is quickly withdrawn . . . Metropolitan Life building to take 12,000 tons of steel . . . Shipbuilding tonnage also in early prospect.

NEW YORK, June 7.—In a market characterized by receding business in most lines, a little flurry was caused last week when several mills booked orders for galvanized sheets at 3.60c., Pittsburgh. One mill is said to have quoted this price to a number of customers, and when this came to the attention of competitors, as it did within a few hours, others met the quotation. However, the 3.60c. quotation was withdrawn after it had been out about two days. In its recent price announcement for the third quarter, the Carnegie-Illinois Steel Corp. stated that its price on galvanized sheets would be announced later, and this announcement has been expected for more than a week.

Shipbuilding tonnage is the most promising prospect for the near future along the Atlantic Seaboard.

It is expected that a new office building for the Metropolitan Life Insurance Co., requiring about 12,000 tons of structural steel, will soon come into the market.

Pig Iron

An occasional carload is being released on old contract, although the large foundries are still out of the market. Some increase in the melt of the jobbing foundries is noted, but it remains to be seen whether a definite trend has set in or not. Confirming evidence of a more active melting rate is seen in the strengthening of cast scrap in the local market. Some foreign orders have been booked, averaging a few hundred tons a piece, and inquiries for lots up to 500 tons are still being received.

Sheets and Plates

Plate sales are being maintained at an even, though low, level and little change is looked for one way or the other in the next few weeks. For most sellers, the volume of orders in May was equal to that in April, but one seller reported only 60 per cent of the volume of the preceding month, but better than for the March period.

Several large public projects are still pending, and in the present thin market, either one of these prospective awards would alter the picture considerably for any one firm.

The reaction to the price changes in sheets and strip has been insignificant, and if the last holiday week is any indication, the trend in sales is distinctly downward. Some sellers have gone as long as three or four days without an order. About the only sheet consumers that appear to be interested in tonnages are the stove makers. Refrigerator manufacturers appear to be covered for present run requirements.

...CINCINNATI...

**...Production around 30%
...Pig iron slow.**

CINCINNATI, June 7.—Steel production in this area is averaging about 30 per cent, with one interest a few points above this. Wire production is being maintained in the neighborhood of 40 per cent of capacity.

With prices on pig iron reaffirmed for the third quarter, melters have no incentive to cover beyond immediate needs. Bookings are still in small quantities and shipments are slower.

...BUFFALO...

**...Wickwire-Spencer to erect
new wire mill.**

BUFFALO, June 7.—Construction activities are highlighted by the taking of bids by the Wickwire-Spencer Steel Co. for a new wire mill building. It is understood the building will be 500 x 399 ft. in area and it is estimated that 1000 tons of fabricated shapes will be required. This is believed to be the first move of a policy recently stated by Wickwire executives in New York City to con-

duct a larger proportion of the company's operation in Buffalo.

Bids will be taken June 21 for a new State highway bridge in Steuben County to require 250 tons of fabricated structural steel. Recent bids taken on Cattaraugus County bridge No. 3956 (150 tons) show C. D. Stewart of Buffalo low bidder.

Demand for finished steel is at low ebb with small operations (nine open hearths) reflecting the trend.

Warehouse business is about even with April. Conditions have leveled out with the decline apparently stopped. No change in flat rolled warehouse prices has yet been announced, but these are expected to come through in the next week or so.

...PIPE LINES...

Continental Oil Co., Ponca City, Okla., has let contract to Mattison, Wallack & Co., Britton, Okla., for steel pipe line gathering system in K-M-A gas field, Wichita County, Tex., to connect with main welded steel pipe line for natural gas transmission to new casinghead gasoline plant to be built in same district. Entire system will have a capacity for handling about 15,000,000 cu. ft. of gas per day.

Universal Consolidated Oil Co., Long Beach, Cal., plans two welded steel pipe lines from bulk terminal in Long Beach harbor district to new casinghead gasoline plant to be built about three miles inland, for gasoline transmission.

Northern Natural Gas Co., Omaha, Neb., plans steel pipe line system for natural gas distribution at Papillion, Neb., including main welded steel pipe line for connection with trunk line to west of municipality, control station at municipal limits and other operating facilities. Cost over \$75,000.

Phillips Petroleum Co., Bartlesville, Okla., has approved plans for new welded steel pipe line from oil field near Crane, Tex., to new oil refinery at Judkins, Tex., about 35 miles, for crude oil transmission. Company also plans welded steel pipe line from Goldsmith, Tex., oil field to refinery at Judkins.

Quartermaster Corp., Mitchell Field, Hempstead, N. Y., closes bids June 10 for 4000 lin. ft. of welded steel pipe; also for tees, expansion joints, etc. (Circular 568-38).

Sun Oil Co., 1608 Walnut Street, Philadelphia, plans new welded steel pipe line from Buckeye Township oil field, Gladwin County, Mich., to Bay City, Mich., for crude oil transmission to bulk terminal to be located at latter place.

St. Francisville, La., has called a special election July 12 to approve bonds for \$25,000 for installation of natural gas pipe line system. J. R. Matthews, mayor, is active in project.

Standard Oil Co. of Ohio, Midland Building, Cleveland, plans two 6-in. welded steel pipe lines across Maumee River, near Toledo, for gasoline transmission, connecting its Southern pipe lines with terminal at last noted place. Company has placed contracts for 3000 tons of 6-in. steel pipe with National Tube Co., Pittsburgh, and Republic Steel Corp., Cleveland, equally divided, for pipe line from Fostoria to Lima, Ohio, almost 50 miles, for gasoline transmission.

Cleveland has awarded 1766 tons of 30 and 36-in. steel pipe to Bethlehem Steel Co. for an extension of water lines from Parma Reservoir.

Steel Exports Lower in April

APRIL shipments of iron and steel products from the United States amounted to 179,250 gross tons valued at \$12,061,586, compared with 188,235 tons valued at \$13,991,641 in March and 255,704 tons valued at \$15,855,175 in April, 1937, the Commerce Department's metals and minerals division reports.

Outstanding in the month's trade was a sharp advance in pig iron shipments to 44,362 tons from 22,519 tons in March as steel ingot exports dropped to 7774 tons from 23,021 tons. Pig iron exports in April totaled 44,362 tons (22,519 in March), while tin plate, ranking next, showed 17,972 tons against 15,201 in March.

A catching up by European producers on domestic requirements is reflected in the Government's export figures which showed Japan was the chief individual market in April (53,723 tons against 47,247 tons in March and 55,495 tons in April, 1937), followed by Canada (23,290 tons against 21,295 in March and 61,650 tons in April of last year).

In the first four months of 1938

Exports (In Gross Tons)	April		Four Months Ended April	
	1938	1937	1938	1937
Pig iron	44,362	38,177	157,210	83,059
Ferromanganese and spiegeleisen	5	1,076	114	1,226
Other ferroalloys	83	60	522	621
Scrap, iron and steel	306,900	421,383	1,253,050	989,443
Scrap, tin plate	2,640	2,827	6,496	9,765
Waste-waste tin plate	412	3,676	2,381	15,047
Pig iron, ferroalloys and scrap	354,402	467,199	1,419,773	1,999,161
Ingots, blooms, billets, sheet bars	7,757	5,216	97,283	17,371
Ingots, etc., alloy steel incl. stainless	17	279	648	911
Skelp	2,752	11,181	5,506	21,453
Wire rods	2,829	6,508	11,477	14,524
Semi-finished steel	13,355	23,184	114,914	54,259
Bars, plain and reinforcing	12,137	12,066	55,699	33,674
Bars, alloy steel	292	616	1,480	2,046
Bars, stainless steel	16	7	172	73
Iron bars	89	114	681	577
Plates, plain and fabricated	23,237	30,425	82,235	79,880
Plates, alloy steel	564	1,104	1,297	1,311
Plates, stainless	91		114	6
Sheets, galvanized steel	3,284	7,261	20,214	21,926
Sheets, galvanized iron	465	437	1,290	2,056
Sheets, black, plain steel	14,180	29,220	70,137	73,961
Sheets, alloy steel	232	60	1,790	141
Sheets, stainless	57	47	961	183
Sheets, black iron	318	1,238	1,896	3,045
Hoops, bands, strips, plain steel	3,340	18,539	21,099	41,781
Hoops, bands, strip steel, alloy	15	57	93	477
Hoops, bands, strip steel, stainless	45	81	212	219
Tin plate and taggers' tin	17,972	30,289	67,309	98,037
Terne plate (including long terne)	249	378	1,978	2,277
Structural shapes, plain material	5,720	12,179	29,190	39,409
Structural material, fabricated	2,897	2,117	15,760	11,015
Sheet piling	171	127	1,379	1,875
Tanks, steel	2,030	2,544	12,192	8,833
Steel rails	7,123	10,340	36,203	37,785
Rail fastenings, switches, spikes, etc.	795	1,996	4,440	5,063
Boiler tubes	1,570	904	4,646	3,862
Casing and oil line pipe	7,099	7,763	32,482	33,401
Pipe, black and galv., welded steel	1,348	3,122	7,307	12,521
Pipe, black and galv., welded iron	260	334	1,594	1,349
Plain and galvanized wire	4,045	3,952	12,913	18,087
Barbed wire and woven wire products	2,682	3,600	6,667	14,261
Wire rope and other products	864	1,365	3,585	4,636
Nails and tacks	1,838	2,386	6,196	8,787
Bolts, nuts, rivets and washers except track	671	1,005	2,793	3,600
Other finished steel	251	314	1,705	928
Rolled and finished steel	115,897	185,987	567,709	567,082
Cast iron pipe and fittings	1,802	3,250	7,456	12,318
Malleable iron screwed fittings	257	411	972	1,425
Carwheels and axles	1,794	1,597	6,555	5,173
Castings, iron and steel	539	1,191	2,075	4,700
Castings, alloy steel, incl. stainless	74	190	225	561
Forgings, plain	1,048	552	3,140	1,877
Forgings, alloy steel, incl. stainless	34	29	170	274
Castings and forgings	5,548	7,220	20,623	26,328
Total	489,202	683,590	2,063,019	1,746,830

Imports (In Gross Tons)	April		Four Months Ended April	
	1938	1937	1938	1937
Pig iron	3,823	11,469	17,670	45,963
Sponge iron	1		313	555
Ferromanganese ¹	986	3,379	3,325	11,407
Spiegeleisen	3,204	1,240	3,835	5,850
Ferrochrome ²	17	34	37	159
Ferrosilicon ³	42	192	199	467
Other ferroalloys ⁴	12	11,713	1	52
Scrap	8,085	28,027	25,841	82,965
Pig iron, ferroalloys and scrap			4	124
Steel ingots, blooms, etc.	4			
Billets, whether solid or hollow	11	220	303	676
Wire rods	271	1,751	1,732	5,982
Semi-finished steel	286	1,971	2,039	6,782
Concrete reinforcement bars	38	586	369	2,639
Hollow steel bars	76	254	396	872
Merchant steel bars	1,462	6,891	5,859	20,888
Iron slabs			1	
Iron bars	112	410	247	832
Boiler and other plate	48	137	103	176
Sheets, skelp, and saw plate	2,121	1,603	4,675	5,635
Die blocks or blanks, etc.	20	18	34	53
Tin plate		12	20	71
Structural shapes	4,473	10,716	11,815	34,047
Sheet piling				854
Rails and track material	458	765	1,399	3,269
Welded pipe	101	2,053	1,270	3,861
Other pipe	259	4,378	9,480	8,462
Cotton ties			19	349
Other hoops and bands	1,579	3,426	5,743	10,560
Barbed wire	554	1,746	6,233	5,548
Round iron and steel wire	98	581	394	1,954
Telegraph and telephone wire			5	8
Flat wire and steel strips	188	300	1,035	1,139
Wire rope and strand	185	396	791	1,151
Other wire	86	252	538	1,219
Nails, tacks, and staples	561	2,686	2,360	7,552
Bolts, nuts, and rivets	17	23	51	230
Horse and mule shoes	39	35	117	87
Rolled and finished steel	12,475	37,268	52,953	111,460
Malleable iron pipe fittings	5	71	36	160
Cast iron pipe and fittings	16	221	508	928
Castings and forgings	370	639	907	1,498
Total	21,237	68,197	82,284	203,792

¹ Manganese content. ² Chrome content. ³ Silicon content. ⁴ Alloy content.

United States Imports of Pig Iron by Countries of Origin

(In Gross Tons)	April		Four Months Ended April	
	1938	1937	1938	1937
United Kingdom	...	...	50	
British India	500	7,791	9,161	23,600
Germany	...	100	...	410
Netherlands	98	2,960	4,358	13,524
Canada	237	318	1,013	3,023
France	...	...	...	...
Belgium	...	...	...	...
Norway	2,988	100	3,138	375
Sweden	200	...	...	400
Russia	...	...	...	4,581
All others	...	...	...	...
Total	3,823	11,469	17,670	45,963

shipments of semi-finished and finished iron and steel products reached 801,092 tons valued at \$53,655,125 compared to 732,575 tons valued at \$48,901,613 in the like period of 1937. Pig iron accounted for 157,210 tons of this total; steel ingots, 97,931; all classes of plates, 83,646, and sheets, 72,888 tons.

April scrap shipments totaled 309,952 tons valued at \$4,846,323 against 338,648 tons valued at \$5,530,042 in March and 427,886 tons valued at \$8,340,759 in April, 1937. Average invoice price per ton of scrap exported last month was \$15.64 against \$16.33 in March and \$19.49 in April of last year.

Uptick in April Iron and Steel Imports

After recording very sharp declines since January of the current year, April imports of semi-finished and finished iron and steel products registered a substantial increase, rising to 21,225 gross tons valued at \$1,140,875, from 11,600 tons in March, with a value of \$990,379, according to a preliminary report released by the Metals and Minerals Division of the Department of Commerce.

The April import trade was 9625 tons higher than the March volume and four products, pig iron, spiegeleisen, shapes and sheets, accounted for 9537 tons of this increase. The outstanding gain (3077 tons) was that registered in pig iron imports. On a tonnage basis, the leading item received in April was structural shapes, whose total of 4473 tons compared with 2123 tons in March and 10,716 tons in April, 1937, and came chiefly from Belgium (3125 tons), and France (1314 tons).

Belgium continued in April to be

the leading import source, and accounted for 6624 tons in comparison with 4492 tons in the preceding month and 15,509 tons in the corresponding one of 1937. The outstanding products in this trade were shapes 3125 tons, hoops and bands 960 tons, and sheets 683 tons. Canada was next with 3598 tons and in this trade the principal product was spiegeleisen 3204 tons. Norway followed with 3267 tons against 1080 tons and 3392 tons and here pig iron (2988 tons), and ferromanganese (259 tons) were outstanding. Germany accounted for 3003 tons against 2369 tons and 10,129 tons, and the principal items were sheets, 1434 tons, barbed wire 336 tons, casting and forgings 178 tons, and nails, tacks, and staples 175 tons. France followed with 2273 tons against 821 tons and 4600 tons, and the predominating products were shapes 1314 tons, ferromanganese 562 tons, hoops 446 tons, and steel bars 411 tons.

Receipts in the initial four-month period of 1938 amounted to 81,823 tons, valued at \$5,226,897 and from the standpoint of volume were less than one-half of the 185,281-ton total valued at \$8,517,255 imported in the like months of 1937.

Living Cost Decline Cuts G-E Wages 2%

GENERAL ELECTRIC CO., has announced a decrease of 2 per cent in its cost of living adjustment plan which is based on the cost of living index published by the U. S. Department of Labor. If the cost of living goes up, 1 per cent is added to

employees' earnings for each point of rise in the index up to 90. If the cost of living goes down, similar changes are made downward, until the index reaches 80.

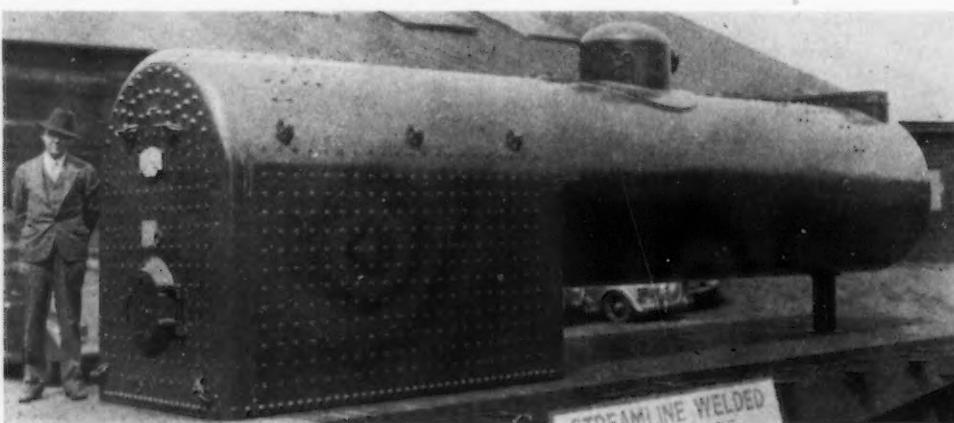
The index figure of 83 announced by the U. S. Department of Labor May 28, is 1.5 below the figure of 84.5 of the past three months.

Fansteel Markets New Alloy and Flux

FOR the brazing of dissimilar metals or alloys, especially under conditions where the brazed joint is subject to heavy loads, a new alloy and flux are being marketed by Fansteel Metallurgical Corp., North Chicago, under the trade names Fanite and Fanflux. They are especially recommended for the brazing of tipped carbide or hard metal cutting tools.

In addition to unusual strength, Fanite is said to hold a plastic stage, as it cools, for a time interval sufficient to allow the contraction of dissimilar metals to reach a normal stage. The material is intended for use in a controlled atmosphere furnace at temperatures from 1950 deg. to 2100 deg. F. It is handled with exactly the same equipment and technique as copper.

Fanite is available in standard strips $1\frac{1}{2}$ in. wide by 8 in. long and 0.004 or 0.010 in. thick. Special sizes are available to order. The 0.004 in. metal is used as a shim between the surfaces to be united so that the brazing metal is in place when it melts. The 0.010 in. metal is used when it is desired to flow the molten metal into the joint by capillary attraction.



RECENTLY exhibited at the Tulsa Oil Show was this Class I welded boiler, rated at 130 hp. and made by Farrar & Trefts, Inc., of Buffalo. Welded seams are used in the barrel, dome, firebox and tube sheet to obviate the difficulty of riveted seams working loose as the boiler is moved about from one location to another in oil field service. All seams have been X-rayed and annealed. The weight has been reduced about 10 per cent by the elimination of overlapping plates and straps needed in riveted construction.

NON-FERROUS

... Better copper demand improves price undertone ... Zinc shipments show sharp rise, although stocks also advance ... Lead in greater demand for July position ... Tin market slightly more active on advancing prices.

NEW YORK, June 7.—With stocks of copper accumulating over the past eight months, major producers are now undergoing a drastic restriction in production. Kennecott has closed down all productive properties for one month or more, and other companies have either started or are considering similar action. Considerably impressed by this action, buyers of the red metal are showing a little more interest in purchases, although turnover during the

past week could hardly be called large. In any case, the price situation has strengthened materially, and it is doubtful whether outside sellers will now be willing to part with any holdings at less than the 9c., Connecticut Valley, figure.

Foreign buying was pretty much at a standstill up to this morning due to the Whitsuntide holidays. However, the market opened this morning fairly active, with the price up to the equivalent of 8.22½c., New York.

The Week's Prices. Cents Per Pound for Early Delivery

	June 2	June 3	June 4	June 6	June 7
Electrolytic copper, Conn.*	9.00	9.00	9.00	9.00	9.00
Lake copper, N. Y.	9.125	9.125	9.125	9.125	9.125
Straits tin, spot, New York	38.75	38.50	38.50	38.75	38.75
Zinc, East St. Louis	4.00	4.00	4.00	4.00	4.00
Zinc, New York	4.39	4.39	4.39	4.39	4.39
Lead, St. Louis	3.85	3.85	3.85	3.85	3.85
Lead, New York	4.00	4.00	4.00	4.00	4.00

*Delivered Connecticut Valley; price ½c. lower delivered in New York.
 Aluminum, virgin, 99 per cent plus 20.00c.-21.00c. a lb., delivered.
 Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
 Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
 Antimony, Asiatic, 13.75c. a lb., prompt, f.o.b., New York.
 Antimony, American, 11.75c. per lb., prompt shipment, New York.
 Quicksilver, \$82.00 per flask of 76 lb.
 Brass Ingots, commercial 85-5-5-5, 9.25c. a lb., less carload, delivered in Middle West
 ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	39.50c. to 40.50c.
Tin, bar	41.50c. to 42.50c.
Copper, Lake	10.00c. to 11.00c.
Copper, electrolytic	10.00c. to 11.00c.
Copper, castings	9.50c. to 9.75c.
*Copper sheets, hot-rolled	17.125c.
*High brass sheets	15.625c.
*Seamless brass tubes	18.375c.
*Seamless copper tubes	17.625c.
*Brass rods	11.625c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.50c.
Lead, American pig	5.00c. to 6.00c.
Lead, bar	5.75c. to 6.125c.
Lead, sheets, cut	7.25c.
Antimony, Asiatic	15.50c. to 16.50c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent	19.50c. to 21.00c.
Solder, ½ and ½	28.50c. to 30.50c.
Babbitt metal, commercial grade	19.00c. to 49.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 25 per cent allowed off for extras, except copper sheets and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	42.75c.
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Zinc

With a tighter situation in effect in the Joplin ore markets, the market on slab zinc has shown an improved tendency during the past few market days. Most consumers are in need of metal, and inquiries now coming in range from prompt positions up to tentative coverage as far forward as September, all at a steady price of 4c. a lb., East St. Louis. Sales of prime Western during the past week totaled 4260 tons, shipments amounted to 31,000 tons, and undelivered contracts at the week's end stood at 23,956 tons. For the month of May, slab zinc shipments advanced about 4000 tons to 24,628 tons, but stocks during the same period advanced almost 13,000 tons to 148,120 tons. Ore production in the Tri-State field dropped to 3125 tons last week, and sales of concentrates underwent a sharp reduction to 2400 tons, with buyers in general asking for more than sellers were willing to offer.

Lead

It is estimated that buyers have covered only about 60 per cent of their probable June consumption, but none the less current inquiry is concentrated mostly in the July position. This latter period is only about 25 per cent covered, so it is evident that considerable more lead is to be purchased. Consumer demands over the past few days at the 4c. price figure have been better than they were when the price was up at either the 4.25c. or 4.50c. levels. Although the automobile, battery and cable lines are not seeking much metal, all other outlets are participating in the current activity.

Tin

Last Thursday the International Tin Committee met, and the markets anticipating some bullish action drove the price up to 38.50c. What was expected was that the 55 per cent quota would be split, 40 per cent going to the market and 15 per cent to a buffer pool. The committee, however, took everyone by surprise by cutting the quota to 45 per cent and delaying for one month any action on how much is to be shifted into the pool. London has taken this action as rather bullish and the price is moving up there, but consumers on this side are doing nothing much other than in some instances welcoming the higher price so that their inventories will show better book values. Today's price for Straits metal in New York is 38.75c., with the trend still upward, and London is £173 for spot, £173 10s. for future, and £175 for the Far East.

Tin, bar	44.75c.
Copper, Lake	10.00c. to 10.25c.
Copper, electrolytic	10.00c. to 10.25c.
Copper, castings	9.75c.
Zinc, slabs	7.00c. to 7.25c.
Lead, American pig	4.50c. to 4.75c.
Lead, bar	7.75c.
Antimony, Asiatic	17.75c. to 18.00c.
Babbitt metal, medium grade	18.75c.
Babbitt metal, high grade	46.75c.
Solder, ½ and ½	25.75c.

Old Metals Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.25c.	7.00c.
Copper, hvy. and wire	5.50c.	6.00c.
Copper, light and bot-toms	4.875c.	5.125c.
Brass, heavy	3.25c.	3.75c.
Brass, light	2.375c.	3.125c.
Hvy. machine composition	5.00c.	6.50c.
No. 1 red brass or compos. turnings	3.75c.	4.75c.
No. 1 red brass or compos. turnings	4.50c.	5.00c.
Lead, heavy	3.25c.	3.625c.
Cast aluminum	5.00c.	6.25c.
Sheet aluminum	9.25c.	10.75c.
Zinc	1.625c.	2.875c.

IRON AND STEEL SCRAP

...Decline of 50c. at Chicago pushes composite down to \$11 . . . European Scrap Cartel buys large tonnage at \$10 for No. 1.

JUNE 7.—Sentimentally in line with the decline in the ingot rate, prices at Chicago have declined 50c. a ton except on blast furnace grades. There has been practically no trading at the new prices, however. With prices on No. 1 steel unchanged at Pittsburgh and Philadelphia, the composite figure is now \$11, down 17c. from last week and \$4 below the January high of \$14. Prices of railroad material are softer in all three of the leading markets, however. At Cleveland, the railroads have declined to part with material at present prices. About the only sign of strength is found in some of the cast grades in the East and in grate bars and brake shoes at St. Louis.

Sale of anywhere from 200,000 to 375,000 tons of scrap to the European Scrap Cartel last week is interpreted as a bearish factor by some, since the price paid for No. 1 steel was \$10 and under, leaving brokers little profit margin, with buying prices ranging from \$8.50 to \$9.50 at New York, lowest of the northern shipping centers. This price is \$5 under the last sale and less than half the price prevailing a year ago. Much of the material has already been covered, however.

Pittsburgh

Further sales of No. 1 steel have been made into consumption in the past week at \$11 and \$10.75 a ton, the former involving more tonnage than the latter. Dealers are experiencing some difficulty in covering these commitments. No. 1 heavy melting is unchanged this week at \$10.50 to \$11 a ton. The market is exceptionally thin and in the absence of sales involving more than a 1000 or 1500 tons, quotations are of necessity based on these transactions.

New York

Based on preliminary cable reports to local sellers, it is estimated that from 200,000 to 375,000 tons of Nos. 1 and 2 steel has been bought by the European Scrap Cartel during the latter part of last week at a reputed price of \$10 and \$8.50, respectively, and some of the tonnage 25c. under these figures. With buying prices in New York unchanged at \$8.50 to \$9.50 for No. 1 steel delivered to barges, surprise is expressed at the narrow margin of profit the exporters left themselves. A sizable portion of the tonnage involved has already been bought

and some of it is already on water waiting ships. Undoubtedly, some large tonnages for Japan held up for lack of credits for the last several months will be shipped to Italy, Germany and the two other countries involved in the latest transaction. It will be remembered that the last big sale to the cartel took place in mid-November, when \$16.50 a ton was paid for No. 1 steel, although Italy bought about 80,000 tons of scrap in mid-winter on the basis of \$15 for No. 1.

For domestic consumption, cast grades are somewhat stronger and have been marked up 50c. due to an apparent scarcity.

Chicago

All prices have been lowered 50c. a ton in sympathy with the decrease in heavy melting steel to \$10 to \$10.50. Nearly all quotations are nominal in the complete absence of important trading. Admission on the part of sellers that No. 1 can be purchased today at \$10.50 was the chief factor in reducing the price. The leading consumer is out of the market for the time being.

Philadelphia

With brokers paying near \$12 for lots of No. 1 steel to cover on a recent \$12.50 order, quotations on heavy melting and sympathetic grades remain unaltered from last week. Spotty shipments are going into practically every district mill at the moment, and heavy breakable cast particularly has developed what might be termed a stronger undertone. A nearby mill increased its stove plate price to \$10.50 late last week, but subsequently retired from the market as all open hearths were taken out of production for the current week. Certain railroad grades have been marked down 50c., partly on the basis of small orders and partly because of consumer indifference.

Cleveland

The decline in the nominal quotations has been checked, the only change this week being a 25c. reduction in a few blast furnace grades at Cleveland. There is still no indication of any mill buying of heavy melting grades and from all appearances June will be even duller than some of the months earlier this year. Although a few cars of cast iron car wheels were sold at \$12, and small amounts of other materials released, the railroads declined to part with railroad steel due to the very low condition of the market.

Buffalo

A Buffalo mill is reported to have bought a recent railroad list, paying \$11.50 Buffalo for the selected heavy

melting steel. This appears to be the only new activity in this market, where new buying has fallen off almost entirely. The price of \$10.50 for No. 1 recently offered by a mill which has been buying right along, so far has found few takers. Many dealers are still busy, however, filling older, higher priced orders to this interest. Material is coming in to dealers' yards in dribbles.

St. Louis

The scrap iron market in St. Louis is quiet. After recent heavy purchases, dealers look for a quiet summer. Country dealers are more inclined to sell, and it is expected that local dealers will have covered their short interests within the next few weeks. Prices are nominally unchanged, with the exception of grate bars and brake shoes, which are 50c. a ton higher, the advance being based on higher prices prevailing in other markets, rather than on any trading here. The Missouri-Pacific has issued a list of 50 carloads of scrap.

Cincinnati

General softness pervades the entire scrap market in this area. A small movement of clippings to a district mill continues, but otherwise dealers report business nil. Prices are unchanged but nominal.

Detroit

With no new automotive lists to bid this week, the local dealers found themselves in an inactive market. Production is on the decrease and indications of a quiet summer are seen.

Boston

Nos. 1 and 2 steel and breakable cast prices, as quoted by a majority of brokers, have again been revised, this time upward simply because it was felt they were out of line with the Pittsburgh market, and not because of buying. As a matter of fact business is at a standstill, with no prospect of betterment. In contrast, prices for export steel have been reduced 50c. a ton. However, during the past week 700 tons of steel turnings left here for Sauda, Norway.

Dynamite Charges Test Navy's Shell-proof Hulls

THIS week the Navy, helped by the new billion dollar building program, made secret tests at Philadelphia of a new "shell-proof" hull by exploding against specially designed armor plate, mounted on a raft, a quantity of high explosives.

The new armor plate, an improved outgrowth of the British Navy's so-called World War "blisters," is expected to result in armor-plating of American warships above and below decks to withstand both aerial bombs and underwater torpedoes.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$10.50 to \$11.00
Railroad hvy. mltng. steel	12.00 to 12.50
No. 2 hvy. mltng. steel	9.50 to 10.00
Scrap rails	13.00 to 13.50
Rails 3 ft. and under	15.00 to 15.50
Comp. steel	10.50 to 11.00
Hand bundled sheets	9.50 to 10.00
Hvy. steel axle turn	9.00 to 9.50
Machine shop turn	6.00 to 6.50
Short shov. turn	6.00 to 6.50
Mixed bor. & turn	5.75 to 6.25
Cast iron borings	5.75 to 6.25
Cast iron carwheels	12.50 to 13.00
Hvy. breakable cast	11.00 to 11.50
No. 1 cupola cast	13.00 to 13.50
RR. knuckles & cplrs.	14.00 to 14.50
Rail coil & leaf springs	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
Low phos. billet crops	14.50 to 15.00
Low phos. punchings	13.00 to 13.50
Low phos. plate	12.50 to 13.50

PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$12.00
No. 2 hvy. mltng. steel	\$9.50 to 10.00
Hydraulic bund., new	11.50 to 12.00
Hydraulic bund., old	8.50 to 9.00
Steel rails for rolling	16.00 to 16.50
Cast iron carwheels	14.50 to 15.00
Hvy. breakable cast	12.50 to 13.00
No. 1 cast	14.00 to 14.50
Stove plate (steel wks)	10.00 to 10.50
Railroad malleable	14.50 to 15.00
Machine shop turn	6.50
No. 1 blast furnace	6.00
Cast borings	6.00
Heavy axle turnings	8.50 to 9.00
No. 1 low phos. hvy.	16.00 to 16.50
Couplers & knuckles	15.00 to 15.50
Rolled steel wheels	15.00 to 15.50
Steel axles	20.00 to 20.50
Shafting	18.50 to 19.00
No. 1 RR. wrought	15.00 to 15.50
Spec. iron & steel pipe	12.00 to 12.50
No. 1 forge fire	9.50 to 10.00
Cast borings (chem.)	9.50 to 10.00

CHICAGO

Delivered to Chicago district consumers:	
Per Gross Ton	
Hvy. mltng. steel	\$10.00 to \$10.50
Auto. hvy. mltng. steel	
alloy free	8.50 to 9.00
No. 2 auto. steel	8.00 to 8.50
Shoveling steel	10.00 to 10.50
Hydraul. comp. sheets	9.00 to 9.50
Drop forge flashings	7.75 to 8.25
No. 1 busheling	8.75 to 9.25
No. 2 busheling, old	3.25 to 3.75
Rolled carwheels	12.50 to 13.00
Railroad tires, cut	14.00 to 14.50
Railroad leaf springs	13.50 to 14.00
Steel coup. & knuckles	12.50 to 13.00
Axle turnings	9.50 to 10.00
Coil springs	14.00 to 14.50
Axle turn. (elec.)	9.50 to 10.00
Low phos. punchings	13.00 to 13.50
Low phos. plates, 12 in. and under	12.00 to 12.50
Cast iron borings	3.50 to 4.00
Short shov. turn	5.00 to 5.50
Machine shop turn	3.50 to 4.00
Rerolling rails	13.25 to 13.75
Steel rails under 3 ft.	13.50 to 14.00
Steel rails under 2 ft.	14.00 to 14.50
Angle bars, steel	12.00 to 12.50
Cast iron carwheels	11.75 to 12.75
Railroad malleable	11.25 to 11.75
Agric. malleable	9.50 to 10.00

Per Net Ton	
Iron car axles	16.00 to 16.50
Steel car axles	14.50 to 15.00
No. 1 RR. wrought	7.50 to 8.00
No. 2 RR. wrought	8.75 to 9.25
Locomotive tires	13.75 to 14.25
Pipes and flues	7.25 to 7.75
No. 1 machinery cast	10.00 to 10.50
Clean auto. cast	9.00 to 9.50
No. 1 railroad cast	9.25 to 9.75
No. 1 agric. cast	9.00 to 9.50
Stove plate	6.50 to 7.00
Grate bars	6.50 to 7.00
Brake shoes	6.00 to 6.50

YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$10.50 to \$11.00
Hydraulic bundles	10.00 to 10.50
Machine shop turn	6.50 to 7.00

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$9.50 to \$10.00
No. 2 hvy. mltng. steel	8.50 to 9.00
Comp. sheet steel	9.00 to 9.50
Light bund. stampings	6.50 to 7.00
Drop forge flashings	8.00 to 8.50
Machine shop turn	4.75 to 5.25
Short shov. turn	5.25 to 5.75
No. 1 busheling	8.00 to 8.50
Steel axle turnings	7.50 to 8.00
Low phos. billet and bloom crops	14.00 to 14.50
Cast iron borings	4.75 to 5.25
Mixed bor. & turn	4.75 to 5.25
No. 2 busheling	4.75 to 5.25
No. 1 cast	12.50 to 13.00
Railroad grate bars	6.50 to 7.00
Stove plate	6.00 to 6.50
Rails under 3 ft.	14.00 to 14.50
Rails for rolling	12.00 to 12.50
Railroad malleable	11.50 to 12.00
Cast iron carwheels	12.00 to 12.50

BUFFALO

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel	\$10.50 to \$11.00
No. 2 hvy. mltng. steel	8.50 to 9.00
Scrap rails	12.00 to 12.50
New hvy. b'dled sheets	9.00 to 9.50
Old hydraul. bundles	7.50 to 8.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.50 to 9.00
Hvy. axle turnings	8.50 to 9.00
Machine shop turn	4.50 to 5.00
Knuckles & Couplers	14.00 to 14.50
Coil & leaf springs	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
Low phos. billet crops	15.00 to 15.50
Shov. turnings	6.00 to 6.50
Mixed bor. & turn	4.50 to 5.00
Cast iron borings	4.50 to 5.00
Steel car axles	14.00 to 14.50
No. 1 machinery cast	13.00 to 13.50
No. 1 cupola cast	12.00 to 12.50
Stove plate	10.50 to 11.00
Steel rails under 3 ft.	15.00 to 15.50
Cast iron carwheels	12.00 to 12.50
Railroad malleable	11.50 to 12.00
Chemical borings	7.50 to 8.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:	
Selected hvy. melting	\$10.25 to \$10.75
No. 1 hvy. melting	10.25 to 10.75
No. 2 hvy. melting	9.75 to 10.00
No. 1 locomotive tires	11.50 to 12.00
Misc. stand. sec. rails	11.00 to 11.50
Railroad springs	13.00 to 13.50
Bundled sheets	5.50 to 6.00
No. 1 busheling	5.50 to 6.00
Cast bor. & turn	1.50 to 2.00
Machine shop turn	2.00 to 2.50
Heavy turnings	7.00 to 7.50
Rails for rolling	13.00 to 13.50
Steel car axles	17.00 to 17.50
Iron car axles	19.50 to 20.00
No. 1 RR. wrought	7.50 to 8.00
No. 2 RR. wrought	10.00 to 10.50
Steel rails under 3 ft.	13.00 to 13.50
Steel angle bars	11.00 to 11.50
Cast iron carwheels	11.50 to 12.00
No. 1 machinery cast	11.00 to 11.50
Railroad malleable	10.50 to 11.00
No. 1 railroad cast	10.00 to 10.50
Stove plate	6.50 to 7.00
Agric. malleable	9.00 to 9.50
Grate bars	7.00 to 7.50
Brake shoes	7.00 to 7.50

CINCINNATI

Dealers' buying prices per gross ton at yards:	
No. 1 hvy. mltng. steel	\$7.75 to \$8.25
No. 2 hvy. mltng. steel	5.75 to 6.25
Scrap rails	10.75 to 11.00
No. 2 steel	9.75 to 10.00
Breakable cast	7.25 to 7.50
Machine shop turn	1.45
Mixed bor. & turn	1.25
Bun. skeleton long	3.85
Shafting	13.00
Cast bor. chemical	5.50
Textile cast	\$12.00 to \$12.50
No. 1 machine cast	12.00 to 12.50

BIRMINGHAM

Per gross ton delivered to consumer:	
Hvy. melting steel	\$11.50 to \$12.00
Scrap steel rails	14.00 to 14.50
Short shov. turnings	7.50 to 8.10
Stove plate	9.00 to 10.00
Steel axles	15.00 to 16.00
No. 1 RR. wrought	10.00
Rails for rolling	15.00 to 16.00
No. 1 cast	14.00 to 16.50
Tramcar wheels	14.00 to 15.00

DETROIT

Dealers' buying prices per gross ton:	
on cars:	
No. 1 hvy. mltng. steel	\$6.50 to \$7.00
No. 2 hvy. mltng. steel	5.50 to 6.00
Borings and turnings	3.00 to 3.50
Long turnings	2.75 to 3.25
Short shov. turnings	3.50 to 4.00
No. 1 machinery cast	11.50 to 12.00
Automotive cast	11.50 to 12.00
Hvy. breakable cast	9.00 to 9.50
Hydraul. comp. sheets	7.00 to 7.50
Stove plate	6.75 to 7.25
New factory bushel	6.00 to 6.50
Old No. 2 busheling	2.00 to 2.50
Sheet clippings	4.00 to 4.50
Flashings	5.50 to 6.00
Low phos. plate scrap	7.50 to 8.00

NEW YORK

Dealers' buying prices per gross ton:	
on cars:	
No. 1 hvy. mltng. steel	\$7.50 to \$7.75
No. 2 hvy. mltng. steel	5.50 to 5.75
Hvy. breakable cast	8.50 to 9.00
No. 1 machinery cast	10.50 to 11.00
Stove plate	7.50 to 8.00
Steel car axles	6.50 to 7.00
Shafting	15.00 to 15.50
No. 1 RR. wrought	11.50 to 11.75
No. 1 wrought long	9.50 to 10.00
Spec. iron & steel pipe	8.50 to 9.00
Rails for rolling	16.00 to 16.50
Clean steel turnings	2.50 to 3.00
Cast borings	2.50 to 3.00
No. 1 blast furnace	2.50 to 3.00
Cast borings (chem.)	9.50 to 10.00
Unprepared yard scrap	4.50 to 5.00
Light iron	3.00 to 3.50

Per gross ton, delivered local foundries:

No. 1 machin. cast	\$13.00 to \$14.00
No. 2 cast	10.50 to 11.00

*\$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:	
No. 1 hvy. mltng. steel	\$10.75 to \$11.00
Scrap	

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are \$2 a ton higher, and delivered Detroit \$3 higher.

Per Gross Ton
Rerolling \$37.00
Forging quality 43.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open-hearth or Bessemer \$37.00

Skelp

Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared 2.10c.

Wire Rods (No. 5 to 9/32 in.)

Per Gross Ton
Pittsburgh or Cleveland \$47.00
Chicago, Youngstown or Anderson, Ind. 48.00
Worcester, Mass. 49.00
Birmingham 50.00
San Francisco 56.00
Galveston 53.00
Rods over 9/32 in. or 47/64 in. inclusive, \$5 a ton over base.

SOFT STEEL BARS

Base per Lb.
Pittsburgh 2.45c.
Chicago or Gary 2.50c.
Duluth 2.60c.
Detroit 2.60c.
Cleveland 2.50c.
Buffalo 2.55c.
Philadelphia 2.77c.
New York 2.81c.
Birmingham 2.60c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 3.00c.

RAIL STEEL BARS (For merchant trade)

Pittsburgh 2.30c.
Cleveland, Chicago, Gary or Moline, Ill. 2.35c.
Buffalo 2.40c.
Birmingham 2.45c.
On cars dock Gulf ports 2.70c.
On cars dock Pacific ports 2.85c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh 2.45c.
Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham 2.50c.
Detroit 2.60c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.95c.

RAIL STEEL REINFORCING BARS (Straight lengths as quoted by distributors)

Pittsburgh 2.30c.
Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham 2.35c.
On cars dock Gulf ports 2.70c.
On cars dock Pacific ports 2.80c.

IRON BARS

Chicago 2.40c.
Pittsburgh (refined) 3.60c.

COLD FINISHED BARS AND SHAFTING*

Base Per Lb.
Pittsburgh 2.90c.
Cleveland, Chicago and Gary 2.95c.
Buffalo 3.00c.
Detroit 2.95c.

* In quantities of 10,000 to 10,000 lb.

PLATES

Base Per Lb.
Pittsburgh 2.25c.
Chicago or Gary 2.30c.
Cleveland 2.45c.
Coatesville or Spar. Pt. 2.35c.
Philadelphia 2.445c.
New York 2.55c.
Birmingham 2.40c.
On cars dock Gulf ports 2.65c.
On cars dock Pacific ports 2.80c.
Wrought iron plates, P'tg. 3.80c.

FLOOR PLATES

Pittsburgh 3.50c.
Chicago 3.55c.
Coatesville 3.60c.
On cars dock Gulf ports 3.90c.
On cars dock Pacific ports 4.05c.

STRUCTURAL SHAPES

Base per Lb.

Pittsburgh 2.25c.
Chicago 2.30c.
Cleveland 2.45c.
Buffalo or Bethlehem 2.35c.
Philadelphia 2.465c.
New York 2.52c.
Birmingham (standard) 2.40c.
On cars dock Gulf ports 2.65c.
On cars dock Pacific ports 2.80c.

STEEL SHEET PILING

Base per Lb.

Pittsburgh 2.60c.
Chicago or Buffalo 2.70c.
On cars dock Gulf or Pacific Coast ports05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton \$42.50
Angle bars, per 100 lb. 2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton \$43.00
Light rails (from rail steel) per gross ton 42.00

Base per Lb.

Spikes 3.15c.
Tie plates, steel 2.30c.
Tie plates, Pacific Coast ports 2.40c.
Track bolts, to steam railroads 4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)

65-5 per cent off list
Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmith, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

NOTE: Following prices superseded by new base quotations of 2.30c., Pittsburgh, and 2.40c., Gary, on hot rolled sheets; 3.35c., Pittsburgh, and 3.45c., Gary, on cold rolled sheets, subject to new 1/4 of extras issued May 18. Until June 30 whichever set of base prices and extras yields lower net will apply.

Hot Rolled, 10 Gage

Base per Lb.

Pittsburgh 2.40c.
Gary 2.50c.
Detroit 2.60c.
Philadelphia 2.72c.
Granite City 2.60c.
Birmingham 2.55c.
On cars dock Pacific ports 2.95c.
Wrought iron, Pittsburgh 4.25c.

Hot Rolled Annealed, 24 Gage

Pittsburgh 3.15c.
Gary 3.25c.
Detroit 3.35c.
Philadelphia 3.47c.
Granite City 3.35c.
Birmingham 3.30c.
On cars dock Pacific ports 3.80c.
Wrought iron, Pittsburgh 5.15c.

Heavy Cold Rolled, 10 Gage*

Pittsburgh 3.00c.
Gary 3.10c.
Detroit 3.20c.
Philadelphia 3.32c.
Granite City 3.20c.
Birmingham 3.15c.
On cars dock Pacific ports 3.60c.

Light Cold Rolled, 20 Gage*

Pittsburgh 3.45c.
Gary 3.55c.
Detroit 3.65c.
Philadelphia 3.77c.
Granite City 3.65c.
Birmingham 3.60c.
On cars dock Pacific ports 4.00c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh 3.80c.
Gary 3.90c.
Philadelphia 4.12c.
Granite City 4.00c.
Birmingham 3.95c.
On cars dock Pacific ports 4.40c.
Wrought iron, Pittsburgh 6.10c.

Electrical Sheets (F.o.b. Pittsburgh)

Base per Lb.

Field grade 3.35c.
Armature 3.70c.
Electrical 4.20c.
Special Motor 5.10c.
Special Dynamo 5.80c.
Transformer 6.30c.
Transformer Special 7.30c.
Transformer Extra Special 7.80c.

Base gage changed from 23 to 24 gage. Gage extras are the same as those applying on hot-rolled, annealed sheets with few exceptions.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating
f.o.b. Pittsburgh 4.10c.
F.o.b. Gary 4.20c.
F.o.b. cars dock Pacific ports 4.30c.

Vitreous Enameling Stock, 20 Gage

Pittsburgh 3.50c.
Gary 3.60c.
Granite City 3.70c.
On cars dock Pacific ports 4.10c.

TIN MILL PRODUCTS

NOTE: Base prices for third quarter unchanged, but will apply only to 29 gage and lighter; all other to be governed by sheet base and extras.

Black Plate, 28 Gage

Pittsburgh 3.30c.
Gary 3.40c.
Granite City 3.50c.
On cars dock Pacific ports, boxed 4.175c.

Tin Plate

Base per Box
Standard cokes, Pittsburgh \$5.35
Standard cokes, Gary 5.45
Standard cokes, Granite City 5.55

Special Coated Manufacturing Ternes

Base per Box
Pittsburgh \$4.65
Gary 4.75
Granite City 4.85

Roofing Terne Plate

Base per Box
(Per Package, 112 sheets, 20 x 28 in.)
8-lb. coating I.C. \$12.00
15-lb. coating I.C. 14.00
20-lb. coating I.C. 15.00
25-lb. coating I.C. 16.00
30-lb. coating I.C. 17.25
40-lb. coating I.C. 19.50

HOT ROLLED STRIP

NOTE: Following prices superseded by new base prices of 2.30c., Pittsburgh, and 2.40c., Gary, subject to new list of extras issued May 18, which provide that base shall apply to strip 12 in. and under; all other to be governed by sheet base and extras. Until June 30 either old or new method may be used.

(Widths up to 24 in.)

Base per Lb.
Pittsburgh 2.40c.
Chicago 2.50c.
Detroit 2.60c.
Granite City 2.60c.
Birmingham 2.55c.

Cooperage Stock

Pittsburgh 2.50c.
Chicago 2.60c.

COLD ROLLED STRIP*

Base per Lb.
Pittsburgh 3.10c.
Cleveland 3.10c.
Chicago 3.39c.
Worcester 3.30c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh or Cleveland 3.25c.
Worcester 3.65c.

COLD ROLLED SPRING STEEL

Pittsburgh
and
Cleveland Worcester
Carbon 0.26-0.50% 3.10c. 3.30c.
Carbon .51-.75 4.45c. 4.65c.
Carbon .76-1.00 6.30c. 6.50c.
Carbon Over 1.00 8.50c. 8.70c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

Per Lb.

Bright wire	2.90c.
Galvanized wire	2.95c.
Spring wire	3.50c.
Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are \$3 a ton above, Birmingham \$3 above, and Pacific Coast prices \$9 a ton above Pittsburgh or Cleveland.	

To the Trade

Base per Keg

Standard wire nails	\$.275
Smooth coated nails	2.75
Cut nails, carloads	3.60

Base per 100 Lb.

Annealed fence wire	\$.315
Galvanized fence wire	3.55
Polished staples	3.45
Galvanized staples	3.70
Barbed wire, galvanized	3.40
Twisted barbless wire	3.40
Woven wire fence, base column	.74
Single loop bale ties, base col.	.63
Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., mill prices are \$2 a ton over Pittsburgh, except for woven wire fence, which is \$3 over Pittsburgh and Birmingham mill prices are \$3 a ton over Pittsburgh.	

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., are \$1 a ton over Pittsburgh; New Orleans, \$8; Mobile, Ala., \$7; Lake Charles, La., \$9 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of \$1 a ton over Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel	Black Galv.	Wrought Iron
1 in.	52	31
1/2 to 3/4 in.	55	38 1/2
1/2 in.	59 1/2	49
1/2 to 3 in.	62 1/2	53
1 to 3 in.	64 1/2	55 1/2

Lap Weld

2	57	47 1/2	2	26 1/2	10
2 1/2 to 3 1/2 in.	60	50 1/2	2 1/2 to 3 1/2 in.	27 1/2	12 1/2
3 1/2 to 6 in.	62	52 1/2	4	29 1/2	16
7 & 8 in.	61	50 1/2	4 1/2	28 1/2	15
9 & 10 in.	60 1/2	50	9 to 12	24 1/2	10
11 & 12 in.	59 1/2	49			
Butt Weld, extra strong, plain ends					
1/2 in.	50 1/2	36 1/2	1/4 & 1/2 in.	.14 + .14	+ .48
1/2 to 3/4 in.	52 1/2	40 1/2	1/2 in.	.21	4
1/2 to 1 in.	57 1/2	48 1/2	3/4 in.	.27	10
1/2 to 2 in.	61 1/2	52 1/2	1 to 2.34	34	16 1/2
1 to 3 in.	63	55	2	33 1/2	16
Lap Weld, extra strong, plain ends					
2 in.	55	46 1/2	2	29 1/2	13 1/2
2 1/2 & 3 1/2 in.	59	50 1/2	2 1/2 to 4.5 in.	20 1/2	
3 1/2 to 6 1/2 in.	62 1/2	54	4 1/2 to 6.5 in.	33 1/2	19
7 & 8 in.	61 1/2	54	7 & 8 in.	34 1/2	19 1/2
9 & 10 in.	60 1/2	50	9 to 12	28	15 1/2
11 & 12 in.	59 1/2	49			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Cold	Hot	Drawn	Rolled
1 in. o.d.	13 B.W.G.	\$ 9.46	\$ 8.41	
1 1/4 in. o.d.	13 B.W.G.	11.21	9.96	
1 1/2 in. o.d.	13 B.W.G.	12.38	11.00	
1 3/4 in. o.d.	13 B.W.G.	14.09	12.51	
2 in. o.d.	13 B.W.G.	15.78	14.02	
2 1/4 in. o.d.	13 B.W.G.	17.60	15.68	
2 1/2 in. o.d.	12 B.W.G.	19.37	17.21	
2 3/4 in. o.d.	12 B.W.G.	21.22	18.85	
3 in. o.d.	12 B.W.G.	22.49	19.98	
2 in. o.d.	12 B.W.G.	23.60	20.97	
2 1/2 in. o.d.	10 B.W.G.	45.19	40.15	
2 3/4 in. o.d.	11 B.W.G.	29.79	26.47	
3 in. o.d.	10 B.W.G.	36.96	32.83	
3 1/2 in. o.d.	9 B.W.G.	56.71	50.38	
4 in. o.d.	7 B.W.G.	87.07	77.95	
Extra for less-than-carload quantities:				
40,000 lb. or ft. or over		Base		
20,000 lb. or ft. to 39,999 lb. or ft.	5%			
20,000 lb. or ft. to 29,999 lb. or ft.	10%			
16,000 lb. or ft. to 19,999 lb. or ft.	20%			
5,000 lb. or ft. to 9,999 lb. or ft.	30%			
2,000 lb. or ft. to 4,999 lb. or ft.	45%			
Under 2,000 lb. or ft.	65%			

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago \$55.00

6-in. and larger, del'd New York \$33.00

*6-in. and larger, Birmingham 47.00

6-in. and larger, f.o.b. dock, San

Francisco or Los Angeles 56.00

F.o.b. dock, Seattle 56.00

4-in. f.o.b. dock, San Francisco

or Los Angeles 59.00

F.o.b. dock, Seattle 56.00

Class "A" and gas pipe, \$3 extra

4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For

200 tons and over, 6-in. and larger is \$46.

Birmingham, and \$54 delivered Chicago and 4-in.

pipe, \$49. Birmingham, and \$58 delivered Chi-

ago.

These prices are for hot-rolled steel bars. The

difference for most grades in electric furnace

steel is 50c. higher. Slabs with a section area

of 16 in. and 2 1/2 in. thick or over take the billet

base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per

lb. Delivered Detroit, 3.75c., carlots

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:

1/2 in. & 6 in. and smaller 65c. and 5c.

Larger and longer up to

1 in. 60 and 10c.

1 1/4 in. and larger 60 and 5c.

Lag bolts 60 and 10c.

Plow bolts, Nos. 1, 2, 3

and 7 65 and 5c.

Hot pressed nuts, and c.p.c.

and t nuts, square or hex.

blank or tapped:

1/2 in. and smaller 65c.

9/16 in. to 1 in. inclusive 60 and 5c.

1 1/4 in. and larger 60c.

* Less carload lots and less than full container

quantity. Less carloads lots in full container

quantity, an additional 10 per cent discount; car-

load lots and full container quantity, still an-

other 5 per cent discount.

Semi-finished hexagon units, U.S.S.

and S.A.E.:

1/2 in. and smaller 60 and 10c.

9/16 in. to 1 in. inclusive 60 and 5c.

1 1/4 in. and larger 60c.

Stove bolts in packages, nuts at-

tached 70c.

Stove bolts in packages, with nuts

separate 70c and 10c.

Stove bolts in bulk 80c.

On stove bolts freight is allowed to destina-

tion on 200 lb. and over.

Large Rivets

(1/2-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland \$3.60

F.o.b. Chicago or Birmingham 3.70

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh 65 and 5c.

F.o.b. Cleveland 65 and 5c.

F.o.b. Chicago and Birming-

ham 65 and 5c.

Cap and Set Screws

(Freight allowed up to but not ex-

ceeding 65c. per 100 lb. on lots of 200

lb. or more)

Per Cent Off List

Milled cap screws, 1 in. dia. and

smaller 50c and 10c.

Milled standard set screws, case

hardened, 1 in. dia. and smaller 75c.

Milled headed set screws, cut

thread 1/4 in. and smaller 75c.

Upset hex. head cap screws U.S.S.

or S.A.E. head cap 1 in. and

smaller 70c and 5c.

Upset set screws, cup and oval

points 80c and 5c.

Milled studs 65c.

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton.

Massillon, Buffalo, Bethlehem.

Base price, \$60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo,

Bethlehem, Massillon or Canton.

Open-hearth grade, base 3.00c.

Delivered, Detroit 3.15c.

S.A.E. Alloy

Series Differential

Numbers per 100 Lb.

200 (1/4% Nickel) \$0.35

2100 (1/4% Nickel) 0.75

2300 (3/4% Nickel) 1.55

2500 (5% nickel) \$2.25

3100 Nickel-chromium 0.70

3200 Nickel-chromium 1.85

3300 Nickel-chromium 3.80

3400 Nickel-chromium 3.20

4100 Chromium-molybdenum 0.55

4100 Chromium-molybdenum 0.75

4600 Nickel - molybdenum (0.20

to 0.30 Mo. 1.50 to 2.00 Ni) 1.10

5100 Chrome steel (0.80-0.90 Cr.) 0.35

5100 Chrome steel (0.80-1.10 Cr.) 0.45

5100 Chromium spring steel 0.15

6100 Chromium-vanadium bar 1.20

6100 Chromium-vanadium spring steel 0.85

Chromium-nickel-vanadium 1.50

Carbon-vanadium 0.85

These prices are for hot-rolled steel bars. The

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	25.00
Delivered Brooklyn	27.50
Delivered Newark or Jersey City	26.53
Delivered Philadelphia	25.84
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	24.00
Delivered Cincinnati	24.44
F.o.b. Duluth	24.50
F.o.b. Provo, Utah	22.00
Delivered, San Francisco, Los Angeles or Seattle	26.95
F.o.b. Birmingham*	20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	\$25.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	24.50
F.o.b. Buffalo	23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	23.50
Delivered Cincinnati	24.61
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44
F.o.b. Birmingham	19.00

Bessemer

F.o.b. Everett, Mass.	\$26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	26.00
Delivered Boston Switching District	26.50
Delivered Newark or Jersey City	27.53
Delivered Philadelphia	26.76
F.o.b. Buffalo and Erie, Pa., and Duluth	25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	24.50
F.o.b. Birmingham	25.00
Delivered Cincinnati	25.61
Delivered Canton, Ohio	25.89
Delivered Mansfield, Ohio	26.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.

\$28.50

Gray Forge

Valley or Pittsburgh furnace \$23.50

Charcoal

Lake Superior furnace \$27.00
Delivered Chicago 30.34

Canadian Pig Iron

Per Gross Ton

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	\$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.	Per Gross Ton
Domestic, 80% (carload)	\$102.50

Spiegeleisen

Per Gross Ton Furnace
Domestic 19 to 21% \$33.00

Electric Ferrosilicon

Per Gross Ton Delivered;
Lump Size
50% (carload lots, bulk) \$69.50*
50% (ton lots in 50 gal. bbl.) 80.50*
75% (carload lots, bulk) 125.00*
75% (ton lots in 50 gal. bbl.) 139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio
Per Gross Ton

10.00 to 10.50%	\$33.50
For each additional 0.50% silicon up to 17%.	
50c. per ton is added.	
Manganese 2 to 3%, \$1 per ton additional.	
For each unit of manganese over 3%, \$1 per ton additional. Phosphorus 0.75% or over, \$1 per ton additional.	
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	\$27.50
For each additional 0.5% silicon up to 17%.	
50c. a ton is added.	
The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.	
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.	
Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.	

Ferrochrome

Per lb. Contained Cr., Delivered Carlots, Lump Size, on Contract
4 to 6% carbon 10.50c.*
2% carbon 16.50c.*
1% carbon 17.50c.*
0.10% carbon 19.50c.*
0.06% carbon 20.00c.*

Silico-manganese

Per Gross Ton, Delivered. Lump Size, Bulk, on Contract
3% carbon \$101.50*
2.50% carbon 106.50*
2% carbon 111.50*
1% carbon 121.50*

Other Ferroalloys

Ferrotungsten, per lb. contained W del. carloads, nominally	\$2.00
Ferrotungsten, lots of 500 lbs. nominally	2.05
Ferrotungsten, smaller lots, nominally	2.10
Ferrovanadium, contract, per lb. contained V., delivered	\$2.70 to \$2.90*
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots.	\$2.25*
Ferrocobaltitium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	\$142.50
Ferrocobaltitium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	\$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton	\$58.50
Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville	\$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.

*Spot prices are \$5 per ton higher
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports	Per Gross Ton
Old range, Bessemer, 51.50%	\$5.25
Old range, non-Bessemer, 51.50%	5.10
Mesabi, Bessemer, 51.50%	5.10
Mesabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore	Per Unit
Iron, low phosph., copper free, 55 to 58% dry, Algeria, nominal	17.00
Iron, low phosph., average, 68½% iron. Nominally 17 to 18c.	
Iron, basic or foundry, Swedish, aver. 65% iron. Nominally 15c.	
Iron, basic or foundry, Russian, aver. 65% iron. Nominally	

Man. Caucasian, washed	52%
Man. African, Indian, 44-48%	40c.
Man. African, Indian, 49-51%	Nominal
Man. Brazilian, 46 to 48½%	Nominally 40c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	\$17.00
Tungsten, domestic, scheelite delivered	\$16.00 to \$19.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade) \$16.00	
Rhodesian, 45% 22.00	
Rhodesian, 48% 25.50	
Turkish, 48-49% 25.00 to \$26.00	
Turkish, 45-46% 23.50 to 24.00	
Turkish, 44% 19.00 to 19.50	
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50% \$25.50 to \$26.50	
48-49% 25.50 to 26.00	

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	\$18.00
No. 2 lumps, 85-5, f.o.b. Kentucky and Ill. mines	\$18.00 to 19.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	\$4.00 to \$4.25
Furnace, f.o.b. Connellsville, Prompt	5.00 to 6.25
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.88 to 11.40
Foundry, by-product, Philadelphia	10.95
Foundry, by-product, delivered Cleveland	11.05
Foundry, by-product, delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars dock, Pacific ports	14.75

FABRICATED STEEL

... Lettings advance to 18,750 tons from 6525 tons last week ... New projects lower at 16,785 tons ... Plate awards call for 3775 tons.

STRUCTURAL STEEL AWARDS

NORTH ATLANTIC STATES

AWARDS

8800 Tons, Washington, Government Printing Office Annex, to Bethlehem Steel Co., Bethlehem, Pa.

290 Tons, Mineola, N. Y., building for Long Island Lighting Co., to Ingalls Iron Works Co., Birmingham.

185 Tons, Ebensburg, Pa., alterations to grandstand, to Bethlehem Steel Co., Bethlehem, Pa.

150 Tons, Manchester and Chester, Vt., bridges, to American Bridge Co., Pittsburgh.

150 Tons, Buffalo, factory extension for Curtis-Wright Co., to R. C. Mahon Co., Buffalo.

120 Tons, New York, exhibit building, American Tobacco Co., World's Fair, to Bethlehem Steel Co., Bethlehem, Pa.

115 Tons, New York, Beechnut Packing Co. building at World's Fair, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

THE SOUTH

1500 Tons, Scottsboro, Ala., 240 transmission towers for TVA, to American Bridge Co., Pittsburgh.

810 Tons, Trenton, Ga., 133 transmission towers for TVA, to American Bridge Co., Pittsburgh.

205 Tons, Memphis, Tenn., 16 transmission towers for TVA, to American Bridge Co., Pittsburgh.

200 Tons, Guntersville and Chickamauga, Ala., gates and bulkhead frames, TVA, to Lakeside Bridge & Steel Co., Milwaukee.

200 Tons, Guntersville and Chickamauga, Ala., gates and bulkhead frames, TVA, to Johnson City Foundry & Machine Co., Johnson City, Tenn.

185 Tons, Dallas and Denton Counties, Tex., bridge, to Austin Brothers, Dallas.

145 Tons, Tangipahoa Parish, La., bridge, to Jones & Laughlin Steel Corp., Pittsburgh.

145 Tons, Coryell County, Tex., bridge, to North Texas Iron & Steel Co., Fort Worth, Tex.

120 Tons, Guntersville, Ala., two bridges for TVA, to Nashville Bridge Co., Nashville, Tenn.

CENTRAL STATES

880 Tons, Chicago, completion of Soldier's Field, to Bethlehem Steel Co.

235 Tons, Troy, Ill., bridge, to Duffin Iron Works, Chicago.

215 Tons, Toledo, Ohio, factory and office building, Coca-Cola Bottling Co., to Bethlehem Steel Co., Bethlehem, Pa.

185 Tons, Osage, Iowa, State bridge, to Bethlehem Steel Co., Bethlehem, Pa.

170 Tons, Lincoln County, Mo., bridges, to St. Louis Structural Steel Co., St. Louis.

130 Tons, Detroit, alterations to S. S. Kresge Co. store, to Palmer-Bee Co., Detroit.

160 Tons, Jefferson County, Mo., bridge, to American Bridge Co., Pittsburgh.

105 Tons, Brownstone, Ind., high school, to Bedford Foundry & Machine Co., Bedford, Ind.

WESTERN STATES

2425 Tons, State of California, bridges for Union Pacific Railroad over Mojave River, to American Bridge Co., Pittsburgh.

785 Tons, Denver, addition to Capitol, to E. Burkhardt & Sons Steel & Iron Works Co., Denver.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

1000 Tons, Tonawanda, N. Y., mill building, Wickwire Spencer Steel Co.

1110 Tons, Bayonne, N. J., transit shed.

500 Tons, Morris Park, N. Y., school building, St. Benedict Joseph Labre Parish.

450 Tons, New York, alterations to New York Telephone Co. building.

250 Tons, Steuben County, N. Y., State highway bridge; bids June 21.

150 Tons, Grant Island, N. Y., Beaver Island State Park bath house.

130 Tons, Katonah, N. Y., head frames, Delaware Aqueduct.

120 Tons, Providence, R. I., two underpasses.

THE SOUTH

2480 Tons, State of Oklahoma, six highway

bridges, including 1580 tons at Bixby; bids due June 21.

270 Tons, Resaca, Ga., bridge No. 83.7.

266 Tons, Paducah, Ky., bridge.

175 Tons, West Point, Ky., units for dam No. 43, United States Engineers Office.

150 Tons, Ashland, Ky., store building; Frank Messer Sons, Cincinnati, general contractor.

CENTRAL STATES

950 Tons, State of Indiana, highway work; bids in.

500 Tons, Danville, Ill., coal tipple.

375 Tons, Rochester, Minn., Mayo civic auditorium.

300 Tons, Leavenworth, Ind., State bridge, road No. 62, Sec. M.

285 Tons, Dayton, Ohio, Veterans Administration buildings, U. S. Treas. Dept.

250 Tons, States of Missouri and Kansas, Missouri Pacific Railroad bridges.

188 Tons, Coshocton County, Ohio, State bridge, Wendling Brothers, Dover, Ohio, low bidders.

175 Tons, Stilesville, Ind., State bridge FAP-4, Section A-3.

165 Tons, Columbus, Ohio, Junior State Fair building; Bethlehem Steel Co. low bidder.

135 Tons, Maxville, Ind., State bridge FAP-628, Section A.

100 Tons, Willoughby, Ohio, Andrews School for Girls; bids June 10.

100 Tons, Cleveland, Anthony Carlin Co. building; bids in.

WESTERN STATES

6000 Tons, Redding, Cal., railroad bridge; bids by Bureau of Reclamation, July 11.

400 Tons, States of Washington and South Dakota, bridges for Great Northern Railway.

FABRICATED PLATES

AWARDS

1930 Tons, Chicamauga, Tenn., Spillway gates, to Dravo Corp., Pittsburgh.

1766 Tons, Cleveland, 30 and 36-in. steel pipe, water line extension, to Bethlehem Steel Co., Bethlehem, Pa.

280 Tons, Chicamauga, Tenn., intake gates, to Ingalls Iron Works Co., Birmingham.

NEW PROJECTS

250 Tons, Marcus Hook, Pa., and Toledo, Ohio, naphtha reforming heater and retaining plates, Sun Oil Co.

200 Tons, Brookline, Mass., water tank.

SHEET PILING

AWARDS

800 Tons, Cleveland, bearing piles for river piers for Main Street bridge, to Carnegie-Illinois Steel Corp., through Lombardo Bros. Construction Co.

THIS WEEK'S MACHINE ...TOOL ACTIVITIES...

... Machine tool sellers look for lean summer . . . Sustaining market factors are the Army and Navy and aircraft builders . . . Canadian armament activity possible source of orders.

Bulk of Cincinnati Orders Still of Foreign Origin

CINCINNATI—The machinery market last week continued the spotty appearance of the preceding period. Little or no change in the market average total of bookings was noted, although lathe builders indicated a moderate improvement in demand. The bulk of business, however, is still of foreign origin. Several multiple unit orders for lathes to be exported were reported. Heavy machinery is in moderate demand, but may be designated as holding its own in the present quietness. Market feeling is still optimistic, particularly in view of the absence of any noticeable seasonal reaction in the present slow market.

Local factories are holding almost stubbornly to a 30 per cent operation. In some instances this is warranted by demand, while in others operations are being sustained in anticipation of fall improvement.

Industrial Buying Low In Middle West

CHICAGO—The month of May, from a sales angle, was very poor. Orders taken dropped as much as 94 per cent below the same period last year, and forecasts for the balance of the summer do not indicate an appreciable improvement. The lists of the Santa Fe and Milwaukee are still in abeyance and, although further action is expected on the former this month, definite assurance to this effect has not been given. Other industrial buying continues at an absolute minimum.

Cleveland Builders Anticipate Two Lean Months

CLEVELAND—Preliminary reports from several tool manufacturers indicate that the domestic sales volume during May was close to the April level. While gradual improvement is confidently expected in time, manufacturers are frank to say that the next two months undoubtedly will be lean. The aircraft industry continues outstanding in the domestic picture and from all indications will continue to maintain its activity during the summer. Other industries are becoming less active.

A number of fair-sized foreign orders were booked during May, adding further to backlog of this class of business.

Cleveland Graphite Bronze Co. is completing a large order for a complete unit of special machinery for the manufacture of thin wall bearings at the Molotov automobile plant in Soviet Russia.

Detroit Sellers Canvassing Canadian Market

DETROIT—Numerous American manufacturers of machine tools located in Detroit, or with representatives here, are probing the Canadian market while the automotive field remains dull. It is reported that 16 Government contracts in Canada will result soon in large production of munitions and military air-

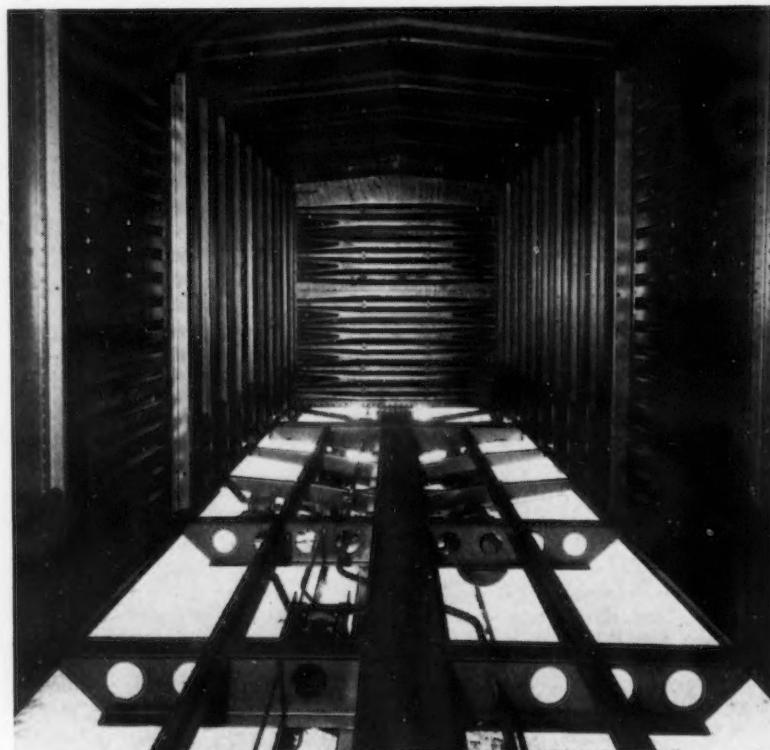
craft. According to reports, 11 of the firms are located in Montreal, the rest in Toronto. The Bren Co. is said to be preparing to manufacture a light machine gun in quantities, while Vickers, Fairchild, Boeing, and the National Steel Car Co. are to produce aircraft in Toronto. For National Steel Car, this will be a new venture and will involve the production of huge bombers, which will be delivered via Trans-Atlantic flights.

Navy Yards Inquiring For Tools in the East

NEW YORK—The month of June started off inauspiciously, with the order level about the same as in the previous week. For some sellers, this meant practically no orders at all, but this statement is not true for the whole. May was not a bad month, the sales volume for one dealer being double that of April, but what has discouraged many is the fact that orders and inquiries showed such a precipitate drop the latter part of the month.

The arsenals and the Navy yards furnish the chief prospects for business this summer. The Brooklyn Navy Yard has recently inquired for several hundred thousand dollars' worth of equipment, but how much of this business will actually be placed is problematical. Both the Charlestown and Portsmouth Navy yards are also inquiring for a few tools.

BOX CAR MADE OF LIGHT WEIGHT STEEL



INTERIOR of light weight box car being made by Bethlehem Steel Co. for Union Pacific Railroad. The center sill is of welded design and the sides and roofs are Mayari R sheets, 0.05 in. thick, approximately half the thickness used in cars made of ordinary steel.

Get the EXTRA "Mileage"



Specify "Maxi" taps for gritty and abrasive materials such as cast iron, aluminum, fiber, low carbon steel, etc. The "Maxi" treatment produces an unusually hard and long wearing surface—easily identified by its jet black color.

• The angle of the tap's cutting edge—the "rake"—is the secret of smooth, easy tapping—and maximum holes between grinds.

"Greenfield" research engineers have spent years in developing the most efficient "rake" angle for ordinary threading jobs. Hence, one reason for the consistently good performance of "Greenfield" taps.

But, for large production jobs "Greenfield" goes further and, without extra charge, will supply taps with the "rake" angle best suited to the particular job and metal in question. This extra tap "mileage" is yours, merely by specifying the metal to be threaded. Try it on your next order.

GREENFIELD TAP & DIE CORPORATION
GREENFIELD, MASS.

Detroit Plant: 2102 West Fort St. Warehouses: New York, 15 Warren St.; Chicago, 611 W. Washington Blvd.; Los Angeles, 441 S. San Pedro St.; San Francisco, 420 Market St.
In Canada: Greenfield Tap & Die Corp. of Canada, Ltd., Galt, Ont.



GREENFIELD

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Ecusta Paper Corp., 345 West Fortieth Street, New York, recently organized, affiliated with Champagne Paper Corp., same address, has let general contract to Fiske-Carter Construction Co., Masonic Temple, Greenville, S. C., for new mill on 225 acre tract on Davidson River, near Brevard, N. C. Plant will comprise 13 one and multi-story buildings for pulp and paper-making divisions, storage and distribution, power house, machine shop and other units. It will specialize in production of cigarette paper stocks. Cost close to \$2,000,000 with equipment. J. E. Sirrine & Co., 215 South Main Street, Greenville, are consulting engineers. New company will be identified with Papeteries Rene Bollore, operating similar mills at Odet and Cascadec, France, and Papeteries de Champagne, with mill at Troyes, France. Henry S. Strauss is president.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 14 for 81 truck-type vacuum cleaners (Schedule 3642) for Brooklyn Navy Yard; until June 17, 12 main reduction gears and spare parts (Schedule 3653) for Brooklyn and Philadelphia yards.

New York City Tunnel Authority, 200 Madison Avenue, New York, asks bids until June 21 for Manhattan mechanical ventilation building of Queens-Midtown Tunnel, between East Forty-first and Forty-second Street, east of First Avenue.

Rossotti Lithographing Co., Inc., 121 Varick Street, New York, has approved plans for new one-story plant, totaling about 70,000 sq. ft. of floor space, on two-acre tract at North Bergen, N. J., to be erected by Bonanno Construction Co., 1827 Bergen Turnpike, North Bergen. An air-conditioning system will be installed. Cost over \$100,000 with equipment. Present works will be removed to new location and capacity increased.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until June 17 for 42 antenna tuning units and 42 mounting units (Circular 235); until June 20, 15 to 20 power units (Circular 221); until June 21, 32,100 lin. ft. of cable and 19 reels (Circular 222).

Cambridge Instrument Co., Inc., Grand Central Terminal, New York, manufacturer of engineering and scientific instruments, parts, etc., plans one-story addition to plant at Ossining, N. Y. Cost over \$80,000 with equipment.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until June 13 for one single-spindle woodworking reversible shaper (Circular 106); until June 15 for drop forgings (Circular 101).

General Foods Corp., 250 Park Avenue, New York, has purchased 10-acre tract between Eleventh and Twelfth Streets, Hoboken, N. J., frontage on Hudson River, for new multi-story processing, packing, storage and distributing plant for which superstructure will begin at once. Cost about \$2,750,000 with equipment. Company will consolidate several present plants at this location. H. K. Ferguson Co., Hanna Building, Cleveland, is general contractor.

United States Engineer Office, New York District, 39 Whitehall Street, New York, asks bids until June 30 for one 115-ft. steam derrick lighter.

Bureau of Air Commerce, Washington, has approved appropriation of \$6,490,950 for expansion and improvement in airport at North Beach, L. I., New York, including new seaplane base, two hangars with repair and reconditioning facilities, flood lighting system and other work.

Commanding Officer, Ordnance Department, Picatinny Arsenal, Dover, N. J., asks bids until

June 13 for unannealed steel wire (Circular 1009); until June 23, six amatol mixers and 55 mixers for smokeless powder (Circular 977), three swing hammer pulverizers (Circular 980), 12 melting and mixing kettles, each 150-gal. capacity (Circular 986), 11 assembling and crimping machines and six detonator presses (Circular 981), 19 TNT drilling machines (Circular 987), three rotary dryers for ammonium nitrate (Circular 982), 12 extruding machines (Circular 984).

Atlantic Refining Co., 260 South Broad Street, Philadelphia, has approved plans for extensions in bulk storage plants at Newark, N. J., New Haven, Conn., and Kettle Point, Providence, R. I. Company will also enlarge docking facilities at Newark. Cost over \$250,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until June 27 for one to four bullet assembly presses, caliber 0.30 (Circular 1094), one to two bullet assembly presses, caliber 0.30 (Circular 1079).

◀ BUFFALO DISTRICT ▶

National Gypsum Co., 190 Delaware Avenue, Buffalo, building products, wall board, etc., is selecting site in Port Wentworth district, Savannah, Ga., for new mill, with power house, machine shop and other mechanical departments. Cost about \$900,000 with equipment. Dock and storage facilities will be arranged on river frontage of plant site, with loading, conveying and other mechanical handling equipment. Bids on general contract will be asked soon.

Bausch & Lomb Optical Co., 635 St. Paul Street, Rochester, N. Y., manufacturer of scientific instruments and parts, optical goods, etc., plans one-story addition. Cost close to \$50,000 with equipment.

◀ SOUTH ATLANTIC ▶

Office of Quartermaster, Fort Benning, Ga., asks bids until June 15 for water-heating boilers, pipe and pipe fittings, valves, meters, water heaters, boilers, regulators and other equipment (Circular 148-145).

J. A. Beavers & Associates, Newnan, Ga., food canners and packers, have plans for new one-story packing plant. Cost close to \$55,000 with equipment. David S. Cutting, Newnan, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 17 for one gasoline motor-driven street cleaner (Schedule 3694) for Naval Air Station, Pensacola, Fla.

◀ NEW ENGLAND ▶

Boston Dry Dock Co., Inc., Boston, recently organized, has acquired former shipyard of Richard T. Green Co., near East Boston, and adjoining property and will remodel for new shipbuilding and repair plant. Work will include new one-story shop and construction buildings, marine railway, new piers and other facilities. Yard will be developed to accommodate five coastwise vessels, four medium ships and 12 trawlers at one time. Another marine railway, making the third such unit, will be installed later. G. Hobart Stebbins, formerly connected with Bethlehem Shipbuilding Corp., Ltd., Quincy, Mass., heads new company.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until June 17 for two pipe-threading and cutting machines (Circular 255), one two-wheel tool grinder, two diamond wheels, two cup wheels and two green grit wheels (Circular 257); until June 24, two motor-driven floor-type buffers (Circular 273).

Massachusetts Broken Stone Co., Waltham, Mass., plans rebuilding of power house at

plant at Stonybrook, near Weston, Mass., recently destroyed by fire. Loss about \$75,000 with two diesel engine units and auxiliary equipment.

Board of Education, Danbury, Conn., Philip N. Sunderland, secretary, plans new two-story trade and vocational school at rear of State Teachers' College. Cost close to \$100,000. Financing will be arranged through Federal aid. Harold F. Dow is superintendent of schools.

◀ WASHINGTON DIST. ▶

Contracting Officer, office of Chief of Engineers, Munitions Building, Washington, asks bids until June 14 for 50 pipe-fitting tool chests for Brooklyn, 50 similar chests for Columbus, Ohio, 20 engineer blacksmith chests for Brooklyn, 60 carpenter's platoon chests for Brooklyn, 50 similar chests for Columbus, 50 platoon demolition chests for Brooklyn, and 50 similar chests for Columbus (Circular 53).

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until June 14 for drills, extractors, arbors, bits, gages, files, reamers, wrenches, vises, plugs, pullers, threading sets, bench grinder, gas soldering furnace, gasoline torch, oil pressure gages, float-level gages, expanders, valve seat tools and other tools (Circular 398-157); until June 17, 24 wheel-alignment indicators, three camber and caster correction tools complete with hydraulic jack, 145 battery chargers, one sheet metal-working motor-driven brake (Circular 398-171), two motor-driven woodworking saws and five universal woodworkers (Circular 398-170).

Dixie Container Corp., Richmond, Va., organized to manufacture corrugated paper containers, has leased about 50,000 sq. ft. in buildings formerly occupied by American Locomotive Co., for new plant. A steam power house will be built. Cost over \$100,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until June 15 for galvanized steel wire nails, wire finishing nails, galvanized steel wire rope, copper pipe, traction steel wire rope, phosphor bronze wire, tiller rope, copper wire, spring steel wire, tackle blocks and other equipment, including electrical laboratory equipment for high school and junior college (Schedule 3358).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 14 for one pot-type gas-fired furnace (Schedule 3530); until June 17 for aluminum and aluminum-alloy tubing (Schedule 3629), parts for airplanes (Schedule 900-1814); until June 21, composition valves (Schedule 3637) for Eastern and Western navy yards; until June 17, 4500 lb. recoil cylinder centrifugal cast bearing bronze liners (Schedule 3641) for Washington yard.

◀ SOUTH CENTRAL ▶

Chattanooga Electric Power Board, Chattanooga, Tenn., asks bids until June 21 for steel structures for power substations Nos. 3 and 6 of new municipal power system, including electrical equipment, control cables, feeder cables, etc. (Contract 3-B). Cost \$98,000. R. H. Hunt & Co., Chattanooga Bank Building, are architects. R. C. Finley is chief engineer for board.

State Department of Public Welfare, Welfare Building, Frankfort, Ky., plans new steam power house and one-story industrial building at institution at LaGrange, Ky. Cost close to \$75,000 with equipment. Associated Architects & Engineers of Kentucky, Washington Building, Louisville, are architects and engineers. Ralph C. Wyatt, first noted address, is chief engineer for department.

Purchasing and Contracting Officer, Office of Quartermaster, CCC Camp, Beauregard, La., asks bids until June 16 for two well pumps, one cylinder pump and two other pumps, with motors, starting switches, etc. (Proposal 5402-73).

Board of Trustees, William R. Moore School of Technology, Memphis, Tenn., has asked bids on general contract for new multi-story school unit at Poplar and Bellevue Streets. Cost over \$175,000 with equipment. Walker

CRANE PLUG DISC VALVES

FOR HEAVY-DUTY INDUSTRIAL SERVICE

● At a pressure of 300 lbs. and a temperature up around 550° F., steam can make short work of a valve that must be operated partly open—unless that valve is designed specifically to meet all those conditions. For this strenuous service, Crane will back its No. 382P Plug Disc Valve against the field. Here's the sturdiness to stand up, month in and month out, under the abuse of running steam continuously through a valve in throttling service. Here's the combination of design and materials that means faithful performance and a tight, sure seat, in service involving frequent opening and closing. Why? It's what's inside these 382P's that counts. It's the right mixture of brains and metals—backed by Crane's

80 years of knowing how to build valves right—checked by every test the Crane laboratories could devise—and proved by the experience of users everywhere. It will pay you to look "inside" a Crane 382P valve, see for yourself why its design is right and its metals chosen to resist *every* condition of use. "The Inside Story of Crane Plug Disc Brass Valves" tells you in a few, full-of-fact pages how Crane designs and builds these valves to give you uncommon service. Send for a copy today.

 **CRANE**

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

CRANE CO., GENERAL OFFICES: 836 SOUTH MICHIGAN AVENUE, CHICAGO

NATION-WIDE SERVICE THROUGH 134 BRANCHES AND
MORE THAN 500 WHOLESALERS

The No. 382P—one of the 15 types
of Crane's brass plug valves

IT'S WHAT'S
INSIDE
THAT COUNTS!

C. Jones, Sr. and Jr., Shrine Building, are architects.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until June 15 for oil purifying equipment for Chickamauga, Tenn., and Guntersville, Ala., hydroelectric power plants.

◀ SOUTHWEST ▶

American Refrigerator Transit Co., Thirteenth and Olive Streets, St. Louis, an interest of Missouri Pacific Railroad Co., will take bids soon on general contract for multi-story, four-unit warehouse and distributing building at Barton and First Streets. Cost close to \$250,000 with conveying, loading and other mechanical-handling equipment. Construction department of Missouri Pacific Railroad, address noted, is architect and engineer.

Sealy Mattress Co., Woodwether Road and Santa Fe Streets, Kansas City, Mo., manufacturer of bed springs, etc., has awarded general contract through Wood Brothers Industrial Corp., Lee Building, to Fogel Construction Co., Reliance Building, for one-story addition, 67 x 125 ft., for expansion in spring division and improvements in present plant. Cost over \$50,000 with equipment. Charles A. Smith, Finance Building, is architect.

Grand River Dam Authority, Vinita, Okla., has postponed closing of bids from June 3 to June 17 for equipment for new hydroelectric generating plant near Pensacola, Okla., including four 20,000-hp. and one 750-hp. hydraulic turbines, with governors, valves and accessories; four 16,000-kva. vertical generators and one 625-kva. horizontal generator; power dam and power house; radial gates, penstocks, electric hoists, cranes and other equipment. Entire project will cost about \$20,000,000. Holway & Neuffer, 2302 East Eighteenth Street, Tulsa, Okla., are consulting engineers.

Tennison Mfg. Co., 1901 Franklin Street, Houston, Tex., manufacturer of sheet metal products, has purchased for expansion about eight-acre tract with three one-story industrial buildings on Houston ship channel. Improvements will be made and present works removed to new location and capacity increased. Plans are under way for one-story addition on adjoining site for office and operating service. Other units are planned later. Joseph Finger, National Standard Building, is architect.

State Highway Department, State House, Austin, Tex., has let general contract to Abilene Construction Co., Abilene, Tex., for one-story equipment and repair shop at Abilene, to include forge shop, with storage facilities. Cost over \$40,000 with equipment.

◀ OHIO AND INDIANA ▶

Cincinnati Auto Spring Co., 218 West Pearl Street, Cincinnati, has let general contract to Anderson & Holz, 3287 Erie Avenue, for new one-story plant, 90 x 120 ft., on Central Avenue. Cost over \$40,000 with equipment.

Construction Service, Veterans' Administration, Washington, asks bids until June 28 for pumping machinery and accessories, and feed-water heater for institution at Dayton, Ohio.

Independent Register Co., 3747 East Ninety-third Street, Cleveland, manufacturer of heating and ventilating registers, etc., has let general contract to Albert M. Higley Co., 2036 East Twenty-second Street, for one-story addition, 110 x 140 ft. Cost over \$75,000 with equipment. Carter Richards Co., Engineers Building, is architect and engineer.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until June 14 for 50 vacuum pump assemblies (Circular 1021), 46 blower and motor assemblies (Circular 1022), oil tank hopper assembly, oil tank inlet flange saddle, 20 oil tank inlet flanges, 20 oil tank inlet flange covers, oil dilution system tank inlet tubes, oil tank sump housing gaskets, etc. (Circular 1049), copper cable (Circular 1023), 41 heavy-duty tractors (Circular 1035); until June 15, five portable electric power plants (Circular 1048); until June 16, 74 hydromatic propeller assemblies, 74 sets of constant speed and

feathering controls, 74 feathering propeller assemblies (Circular 1029), one power-driven grader and one six-ton power-driven roller (Circular 1044), propeller control governor assemblies in lots of 20 to 105 (Circular 1033).

Acme Engineering Co., Inc., Old First National Bank Building, Fort Wayne, Ind., has plans for hydroelectric power development on Salomie River in Huntington and Wabash Counties, near Huntington, Ind., where sites have been acquired. It will consist of three power dams and two hydroelectric generating stations, with transmission line, power substation, switching station and other operating facilities. Cost over \$350,000. Bids for equipment will be asked late in summer. P. H. Clouser is head.

◀ WESTERN PA. DIST. ▶

County Controller of Allegheny County, County Office Building, Pittsburgh, asks bids until June 16 for metal sign posts and metal traffic signs.

Purglave Gas Coal Corp., Purglave, W. Va., has let contract to United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia, for new steel tipple and coal-cleaning plant at mine No. 5. Cost over \$100,000 with machinery.

City Council, Oil City, Pa., plans extensions and improvements in municipal airport, including new hangar with repair and reconditioning facilities, and other structures. Cost about \$100,000. Financing has been arranged through Federal aid.

◀ MIDDLE WEST ▶

Wilson & Bennett Mfg. Co., 6532 South Menard Street, Chicago, manufacturer of steel barrels, drums, etc., has plans for one-story branch plant on Washington Avenue, Port Arthur, Tex., with adjoining works. New plant will manufacture steel containers from 1-gal. to over 50-gal. capacity. Cost close to \$50,000 with equipment.

John Deere Tractor Co., Waterloo, Iowa, agricultural equipment, has let general contract to Jens Olesen & Sons, 1670 Sycamore Street, for one-story and basement addition, 20 x 160 ft., for expansion in sheet metal division. Cost over \$60,000 with equipment.

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until June 17 for clamping rings, cord clamp spacers, connecting button washers, cord clamps, strap spring clips and other equipment (Circular 99).

City Council, Mount Pleasant, Iowa, asks bids until June 15 for extensions and improvements in municipal electric power plant, including new 1000-kw. turbo-generator unit, air filter, condenser, circulating pumps and drives, steam piping, etc. Appropriation has been arranged.

Illinois State Highway Department, Springfield, Ill., will take bids soon on general contract for one-story equipment and shop building, 195 x 600 ft., at Dixon, Ill., including forge shop and other mechanical divisions, with storage and distributing facilities. Cost over \$80,000 with equipment. Ralph C. Harris is department architect, first noted address.

Ben Sadoff, president, Wells Mfg. Co., Fond du Lac, Wis., manufacturer of ignition coils, etc., has acquired business of American Motor Products Co., New York, manufacturer of replacement ignition parts and specialties, and is transferring factory and office to Fond du Lac, where it has been given 35,000 sq. ft. in Sadoff industrial center. Some additions will be made to equipment.

Wisconsin Highway Commission, State Capitol, Madison, will take bids soon under revised plans for highway laboratory and sign and signal fabricating shop, 65 x 148 ft., two stories and basement. Bids on original plans exceeded appropriation of \$175,000. E. L. Roettiger is State highway engineer.

Heresite & Chemical Co., Manitowoc, Wis., manufacturer of molding powders, resistant industrial coatings, synthetic resins and

plastics, has purchased factory on South Fourteenth Street, heretofore occupied under lease, and plans expansion, including purchase of equipment.

Wisconsin Fabricating Co., 401 South Pearl Street, Green Bay, Wis., is considering bids by Foeller, Schober & Berners, local architects, for L-shaped factory building, 34 x 134 and 34 x 75 ft., on South Broadway, to cost \$40,000 with equipment.

Oconomowoc, Wis., Canning Co., has placed general contract with Central Construction Co., Medford, Wis., for power plant addition, 40 x 60 ft., at branch factory at Sun Prairie, Wis., to cost about \$35,000.

◀ MICHIGAN DISTRICT ▶

Parke, Davis & Co., 1 McDougall Street, Detroit, chemical products, drugs, etc., has asked bids for foundations for seven-story addition to plant at foot of Euclid Avenue, and will take bids soon for superstructure. Cost over \$350,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

National Safety Marker Co., Pontiac, Mich., recently organized to manufacture bronze safety lane markers for traffic service on city streets, has taken over a local building and will begin production soon. C. E. Summers and W. A. Englehart head new company.

City Council, Ann Arbor, Mich., has plans for new pumping station for municipal waterworks. Fund of about \$200,000 will be used for this and new sewage disposal works, for which plans also are nearing completion. Ayres, Lewis, Norris & May, Ann Arbor, are consulting engineers.

◀ PACIFIC COAST ▶

Swift & Co., Union Stock Yards, Chicago, have asked bids on revised plans for additions to plant at Vernon, Los Angeles, comprising a six-story L-shaped building, 144 x 168 ft., five-story unit, 115 x 135 ft., four-story structure, 124 x 141 ft., and smaller units. Cost over \$1,000,000 with equipment.

Bureau of Reclamation, Denver, asks bids until June 14 for steel bulkhead gate liners and anchor rods for bulkhead gates at outlet ends of turbine draft tubes in nine main units and three station-service units at Grand Coulee power plant, Columbia Basin project (Specification 1075-D).

Moline Elevator Co., 113 Madison Street, Seattle, manufacturer of elevators and parts, has leased one-story machine shop, 30 x 108 ft., to be erected by Charles Clise, Securities Building, at 2349 Fourth Avenue. Cost close to \$45,000 with machinery. Bids have been asked on general contract. Henry Bittman and Harold Adams, Securities Building, are associated architects.

Best Universal Lock Co., Inc., 1101 Post Street, Seattle, locks and locking devices, has leased about 20,000 sq. ft. of floor space in former plant of Cole Motor Car Co., 730 East Washington Street, Indianapolis, for main plant. Seattle works will be removed to new location and capacity increased.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 17 for 20,300 lb. propeller shafting, 107,140 lb. of stern tube shafting, and 66,075 lb. of rough-turned propeller shafting (Schedule 3620); until June 24, 480 doz. hacksaw blades (Schedule 3683) for Mare Island Navy Yard; until June 17, two shaft assemblies and parts for airplanes (Schedule 900-1795), turnbuckle eyes for pins for airplanes (Schedule 900-1696); until June 21, 125 power-driven fuel pumps, 75 engine-driven vacuum pumps and 100 single engine primers (Schedule 3690) for San Diego Naval Air Station.

Pacific Gas & Electric Co., 445 Sutter Street, San Francisco, has secured permission to build a new steam-electric generating plant at Oleum, Cal., for power supply for oil refinery of Union Oil Co. of California, Inc., at that place. Cost about \$5,000,000 with equipment, transmission lines, power substations and other structures.

PRODUCTS INDEX

BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.

Pangborn Corporation, Hagerstown, Md.

BLAST FURNACES

Brasert, H. A. & Co., Chicago, Ill.

BLAST GATES

Rockwell, W. S., Co., 50 Church St., N.Y.C.

BLOCKS—Chain

Yale & Towne Mfg. Co., The, Phila. Div., Penna., Pa.

BLOWERS

Buffalo (N. Y.) Forge Co., 492 Broadway, Ingersoll-Rand Co., 11 Broadway, N. Y. C.

BLOWERS—Rotary & Centrifugal

Roots-Connersville Blower Corp., Connerville, Ind.

BLOWPIPES—Oxy-Acetylene Welding & Cutting

Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

BLOWPIPES—Soldering, Heating, Annealing

American Gas Furnace Co., Elizabeth, N.J.

BOILERS

Munroe R. & Sons Mfg. Corp., Pittsburgh.

BOILERS—Waste Heat

Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOILERS—Water Tube

Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOLT CUTTERS

Lands Mch. Co., Inc., Waynesboro, Pa.

BOLT AND NUT MACHINERY

Eric (Pa.) Mfg. Co., The, Euclid, Ohio.

Lands Mch. Co., Inc., Waynesboro, Pa.

Manville, E. J., Mch. Co., Waterbury, Ct.

Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

BOLT & RIVET CLIPPERS

Halwig Mfg. Co., St. Paul, Minn.

BOLTS—Carriage and Machine

Cleveland (Ohio) Cap Screw Co., The

Eric (Pa.) Bolt & Nut Co.

Lanson & Sessions Co., The, Cleveland.

Oliver Iron & Steel Corp., Pittsburgh.

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special

Eric (Pa.) Bolt & Nut Co.

Lanson & Sessions Co., The, Cleveland.

Oliver Iron & Steel Corp., Pittsburgh.

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Special, Hot or Cold Upset

Lanson & Sessions Co., The, Cleveland.

Oliver Iron & Steel Corp., Pittsburgh.

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS—Stove

Lanson & Sessions Co., The, Cleveland.

BOLTS—Steve, Recessed Head

American Screw Co., Providence, R. I.

BOLTS—Track

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

BOLTS & NUTS

American Screw Co., Providence, R. I.

Clark Bros. Bolt Co., Milldale, Conn.

Eric (Pa.) Bolt & Nut Co.

Lanson & Sessions Co., The, Cleveland.

Oliver Iron & Steel Corp., Pittsburgh.

Republic Steel Corp., Cleveland, Ohio.

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS AND NUTS—Self Locking

Lanson & Sessions Co., The, Cleveland.

BOND—Grinding Wheel

Bakelite Corp., 247 Park Ave., N. Y. C.

BORING BARS

Bullard Co., The, Bridgeport, Conn.

BORING, DRILLING & MILLING MA-

CHINES—Horizontal

Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.

Lucas Machine Tool Co., Cleveland.

National Automatic Tool Co., Richmond Ind.

BORING & DRILLING MACHINES—

Vertical

Baker Bros., Inc., Toledo, Ohio.

Bullard Co., The, Bridgeport, Conn.

BORING MACHINES—Diamond

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

BORING MACHINES—Jig

Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

BORING & TURNING MILLS—Vertical

Bullard Co., The, Bridgeport, Conn.

Cincinnati (Ohio) Planer Co.

Rogers Machine Wks., Alfred, New York.

BRAKE LINING AND BLOCKS—Asbes-

tos

Manhattan Rubber Mfg. Div. of Ray-

bestos-Manhattan, Inc., The, 2 Town-

send St., Passaic, N. J.

JUST BETWEEN US TWO

He Gets You to Tell All

YOUR perfect newsgatherer is one with a passion for listening. You talk and he subtly steers you back to the main line whenever you sidetrack yourself with obtrusions on Washington and observations on blended vs. straight rye, the run-up vs. the No. 7 iron approach, what Junior said when his baby sister arrived, and such trivia.

Such a newsgatherer is your Cleveland eyes and ears, a man possessed of one of those impenetrable personalities against which X-rays merely blunt their little noses. Therefore, this can be little more than a silhouette.

Name: Don R. James, Ohio Wesleyan.

Distinguishing characteristic: An ability to get you to do most of the talking. He merely looks expectant, and you're off like a hound after the electric hare. He has a "come-on-tell-poppa" look about him, which, combined with a Calvinistic attitude toward the joys of idleness, makes him an ace field editor.

Don is tall, slim, thin-thatched. Unlike his illustrious forebear, Jesse, he radiates dependability—the type you think of naming as executor if you ever get around to making a will. But they do say he can build up a high voltage temper, which, when touched off, lights up the sky for miles around.

Married? Yes; no little Jameses.

He Was A Stranger and They Done Him Wrong

A SOUTH AMERICAN subscriber who spent the last several months in Brooklyn, presumably to brush up on the language, writes:

"I would like to ask you a favor. Change my address back to Buenos Aires if it ain't much bother."

It ain't. We done it.

Without Benefit of Ouija Board

OF the millions of words published each week in the American press regarding business conditions, we suspect that the 717 most significant are those which make up the "Summary of the Week" in your favorite family journal. See page 84.

The Summary—always spoken of reverently with a capital "S"—is based on teletyped and telegraphed reports that come in each Tuesday from field editors at strategic points. It's a 180 proof distillation of pure fact, plus a jigger of interpretation and a dash of divination.

Our field editors are no seventh sons. Theirs is a legwork job—finding out who is buying iron and steel. These are the raw materials of so many industries that their demand records the slightest quiver in business barometric pressure.

Keep an eye on the Summary and on the sectional market reports on which it is based, and you'll be able to give the high-priced prognosticators cards and spades in calling the turn.

Souvenir of Flaming Crash

AIR MAIL planes flying north, west and south each Tuesday night carry the Summary to the country's leading newspapers. A copy addressed to the Milwaukee News was in the United airliner which crashed near the Cleveland airport Tuesday night, May 24.

Edges charred and only part decipherable, it reached the News thirty-six hours later, so the newspaper photographed it and published it as received.

Conversation Killer

THEN there is an anonymous note from our old friend, "S.W." of Chicago, who writes:

"As an antidote for Jim Rowan's labor stories appearing in The Iron Age I recommend Louis Adamic's 'Dynamite,' also 'The Labor Spy Racket' and 'Leaders of Labor.'

"Better read them," he says, "as you will want to know what you are talking about in conversation with Rowan." He takes too much for granted there. We converse most freely when not handicapped by exact knowledge.

—A. H. D.



PRODUCTS INDEX

CARBIC

Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

CARBIDE

Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

CARBIDE—BORON

Norton Co., Worcester, Mass.

CARBURIZING—See Heat Treating

CARS—RAILWAY

Iron & Steel Products, Inc., Chicago.

CARS—INDUSTRIAL AND MINING

Atlas Car & Mfg. Co., The, Cleveland.

CASE HARDENING—See Heat Treating

CASTINGS—ACID OR HEAT RESISTING

Cramp Brass & Iron Foundries Co., Philadelphia.

Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

Hoskins Mfg. Co., Detroit, Mich.

Jewell Alloy & Malleable Co., Inc., 173 Hertel Ave., Buffalo, N. Y.

Meemanite Metal Corp., Pittsburgh.

Michigan Products Corp., Michigan City, Ind.

Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—ALLOY IRON

Cramp Brass & Iron Foundries Co., Philadelphia.

Forging & Casting Corp., The, Ferndale, Mich.

Michigan Products Corp., Michigan City, Ind.

Western Foundry Co., Chicago.

CASTINGS—ALLOY STEEL

Advance Foundry Co., The, Dayton, Ohio.

Hartford (Conn.) Electric Steel Corp.

Mackintosh-Hempill Co., Pittsburgh.

Michigan Products Corp., Michigan City, Ind.

Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—ALUMINUM

Aluminum Co. of America, Pittsburgh.

Fairmount Foundry, Inc., Phila., Pa.

CASTINGS—BRASS, BRONZE, COPPER OR ALUMINUM

Runting Brass & Bronze Co., The, Toledo, Ohio.

Carbon Malleable Casting Co., Inc., Lancaster, Pa.

Cramp Brass & Iron Foundries Co., Philadelphia.

National Bearing Metals Corp., Pittsburgh.

Phosphor Bronze Smelting Co., The, Phila.

Snyder, W. P., & Co., Pittsburgh.

Spencer's, I. S., Sons, Inc., Guilford, Ct.

CASTINGS—CORROSION RESISTING

Cramp Brass & Iron Foundries Co., Philadelphia.

Meemanite Metal Corp., Pittsburgh.

Michigan Products Corp., Michigan City, Ind.

Midvale Co., The, Nicetown, Phila., Pa.

CASTINGS—DIE, ALUMINUM

Aluminum Co. of America, Pittsburgh.

CASTINGS—ELECTRIC STEEL

Crucible Steel Castings Co., Lansdowne, Pa.

CASTINGS—GRAY IRON

Advance Foundry Co., The, Dayton, Ohio.

American Engineering Co., Philadelphia.

Chambersburg (Pa.) Engineering Co.

Commercial Steel Casting Co., Marion, Ohio.

Cranes Brass & Iron Foundries Co., Phila.

Fairmount Foundry, Inc., Phila., Pa.

Laconia (N. H.) Malleable Iron Co., Inc.

Midvale Co., The, Nicetown, Phila., Pa.

Murray Iron Wks. Co., Burlington, Iowa.

National Roll & Fdry. Co., Avonmore, Pa.

North Wales (Pa.) Mach. Co., Inc.

Spencer's, I. S., Sons, Inc., Guilford, Ct.

Western Foundry Co., Chicago.

CASTINGS—HIGH TEST & ALLOY IRON

Cramp Brass & Iron Foundries Co., Philadelphia.

Meemanite Metal Corp., Pittsburgh.

Western Foundry Co., Chicago.

CASTINGS—MAGNESIUM ALLOYS

Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

CASTINGS—MALLEABLE

Baltimore (Md.) Malleable Iron & Steel Casting Co.

Carbon Malleable Casting Co., Inc., Lancaster, Pa.

Jewell Alloy & Malleable Co., Inc., 173 Hertel Ave., Buffalo, N. Y.

Laconia (N. H.) Malleable Iron Co., Inc.

Lake City Malleable Co., The, 5100 Lakeside Ave., Cleveland.

Malleable Iron Fittings Co., Branford, Ct.

Pearl (Ill.) Malleable Castings Co.

CASTINGS—MECHANITE METAL

Meemanite Metal Corp., Pittsburgh.

CASTINGS—MOLY & NICKEL

Cramp Brass & Iron Foundries Co., Philadelphia.

Superior Bronze Corp., Erie, Pa.

CASTINGS—SEMI-STEEL

Cramp Brass & Iron Foundries Co., Philadelphia.

Malleable Iron Fittings Co., Branford, Ct.

CASTINGS—STEEL

Bethlehem (Pa.) Steel Company.

Birdsboro (Pa.) Steel Foundry & Machine Co.

Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.

Commercial Steel Casting Co., Marion, Ohio.

Crucible Steel Castings Co., Lansdowne, Pa.

Hartford (Conn.) Electric Steel Corp.

Jewell Alloy & Malleable Co., Inc., 173 Hertel Ave., Buffalo, N. Y.

Mackintosh-Hempill Co., Pittsburgh.

Malleable Iron Fittings Co., Branford, Ct.

Mesta Mch. Co., Pittsburgh.

Michigan Products Corp., Michigan City, Ind.

Midvale Co., The, Nicetown, Phila., Pa.

Standard Steel Wks. Co., Burnham, Pa.

Strong Steel Foundry Co., Buffalo, N. Y.

CASTINGS—WEAR RESISTING

Meemanite Metal Corp., Pittsburgh.

Western Foundry Co., Chicago.

CEMENT—ACID-PROOF

Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CEMENT—REFRACTORY

Carborundum Co., The, Perth Amboy, N. J.

Johns-Manville Corp., 22 East 40th St., New York City.

CEMENT—RUBBER

Goodrich, B. F., Co., The, Akron, Ohio.

United States Rubber Products, Inc., 1799 Broadway, N. Y. C.

CHAINS—CONVEYOR & ELEVATOR

Baldwin-Duckworth Chain Corp., Springfield, Mass.

Diamond Chain & Mfg. Co., Indianapolis, Ind.

Ramsey Chain Co., Inc., Albany, N. Y.

Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—POWER TRANSMISSION

Baldwin-Duckworth Chain Corp., Springfield, Mass.

Diamond Chain & Mfg. Co., Indianapolis, Ind.

Ramsey Chain Co., Inc., Albany, N. Y.

Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—ROLLER

Baldwin-Duckworth Chain Corp., Springfield, Mass.

Diamond Chain & Mfg. Co., Indianapolis, Ind.

Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—SILENT

Ramsey Chain Co., Inc., Albany, N. Y.

Whitney Chain & Mfg. Co., Hartford, Ct.

CHAIRS—STEEL, OFFICE

Harter Corp., Sturgis, Mich.

CHANNELS—SEE ANGLES, BEAMS, CHANNELS AND TEES

CHECKS—METAL

Cunningham, M. E., Co., Pittsburgh.

Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

CHEMICALS—INDUSTRIAL

De Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.

Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CHEMICALS—RUST PROOFING

Parker Rust Proof Co., 2186 Milwaukee Ave., Detroit.

Parkin, William M., Co., Pittsburgh.

Udylite Co., The, Detroit.

CHROMIUM METAL & ALLOYS

Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CHROMIUM PLATING—SEE PLATING—CHROMIUM

CHUCKING MACHINES—MULTIPLE SPINDLE

Baird Mch. Co., The, Bridgeport, Conn.

Goss & DeLeeuw Machine Co., New Britain, Conn.

National Acme Co., The, Cleveland.

Potter & Johnston Machine Co., Pawtucket, R. I.

CHUCKS—AIR OPERATED

Hannifin Mfg. Co., Chicago.

CHUCKS—DRILL

Cleveland (Ohio) Twist Drill Co., The.

Cushman Chuck Co., Hartford, Conn.

Morse Twist Drill & Mach. Co., New Bedford, Mass.

CHUCKS—DRILL, QUICK CHANGE

Apex Machine & Tool Co., The, Dayton, Ohio.

CHUCKS—ELECTRIC

Cushman Chuck Co., Hartford, Conn.

CHUCKS—LATHES

Cushman Chuck Co., Hartford, Conn.

CHUCKS—MAGNETIC

Taft-Pelce Mfg. Co., The, Woonsocket, R. I.

CHUCKS—TAPPING

Apex Machine & Tool Co., The, Dayton, Ohio.

CIRCLES—PHOSPHOR BRONZE

Phosphor Bronze Smelting Co., The, Phila.

CLEANERS—METAL

American Chemical Paint Co., Ambler, Pa.

Ford, J. R., Co., The, Wyandotte, Mich.

Pennsylvania Salt Mfg. Co., Phila., Pa.

CLEANING COMPOUNDS—ALKALI

Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CLEANING EQUIPMENT (METAL)—ELECTRO-CHEMICAL

Bullard Co., The, Bridgeport, Conn.

CLUTCH-BRAKES—MAGNETIC

Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES

Automatic Safety Clutch Co., The, Chicago.

Fairbanks, Morse & Co., Chicago.

Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.

COATERS—ELECTRIC

Clark Controller Co., The, Cleveland.

Cutter-Hammer, Inc., Milwaukee.

Electric Controller & Mfg. Co., The, Cleveland.

CONTROLLERS—VALVE, ELECTRICALLY OPERATED

Cutter-Hammer, Inc., Milwaukee.

Leeds & Northrup Co., Philadelphia.

Vickers, Inc., 1420 Oakman Blvd., Detroit.

CONVEYING AND ELEVATING MACHINERY

Farquhar, A. B., Co., Ltd., York, Pa.

Logan Co., Inc., Louisville, Ky.

CONVEYOR WORMS

Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

CONVEYORS—GRAVITY

Farquhar, A. B., Co., Ltd., York, Pa.

CONTROLLERS—MONORAIL

Cleveland Tramrail Div. of The Cleveland

Land & Engng. Co., Wickliffe, Ohio.

COOLING SYSTEMS—WATER

Marley Co., The, Kansas City, Kansas.

COPING MACHINES

Schaefer Mfg. Co., The, Poughkeepsie, N. Y.

CORE OIL

Penola, Inc., Pittsburgh.

Standard Oil Co., Philadelphia.

Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

CORUNDUM WHEELS—SEE GRINDING WHEELS

COTTERS AND KEYS—SPRING

Hindley Mfg. Co., Valley Falls, R. I.

Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.

Lamson & Sessions Co., The, Cleveland.

Western Wire Prods. Co., St. Louis, Mo.

COUNTERBORES

Cleveland (Ohio) Twist Drill Co., The.

Gairing Tool Co., Detroit.

Morse Twist Drill & Mch. Co., New Bedford, Mass.

COUNTERS—PRODUCTION

Veeder-Root, Inc., Hartford, Ct.

COUNTING MACHINES

Veeder-Root, Inc., Hartford, Conn.

COUPLINGS—FLEXIBLE

Diamond Chain & Mfg. Co., Indianapolis, Ind.

Lovejoy Flexible Coupling Co., Chicago.

Poole Foundry & Mch. Co., Baltimore, Md.

Ramsey Chain Co., Inc., Albany, N. Y.

COUPLINGS—PIPE

Harrisburg (Pa.) Steel Corp.

National Tube Co., (U. S. Steel Corp. Subsidiary), Pittsburgh.